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ABSTRACT

The volume contains essays and classroom activities on a variety of U. S. and Canadian census materials. Designed to present census data in a less formidable manner than it is usually presented, it is intended for social studies teachers and college professors who want to introduce census materials in their classrooms. Essays treat various government publications that deal with censuses on population, housing, business, mineral industries, agriculture, and Canada's population. Some of the 24 essays are about the U.S. Bureau of Census, the use of population statistics as indicators, suburban zoning conflict, the use of vital statistics in geography, population models in high schools, investigating the geography of crime, voting, electoral geography and the concept of scale, mineral resource data for geographic research and instruction, geographical trends in coal industry, U.S. historical statistics, U.S. fertility patterns, and recent federal mapping of interest to geography teachers. The volume is arranged so that topic-related activities follow essays. The classroom activities involve map and graph preparation, discussion, simulation, role playing, and research. The last part of the volume is devoted to discussion of the GE-50 Series maps produced by the Department of Commerce. (ND)

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CENSUS DATA:

Geographic Significance and Classroom Utility

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A National Council for Geographic Education Pacesetter Book

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PREFACE

The idea for this volume came nearly a year and a half ago when it became apparent that there was an instructional need for a reference volume that singly deals with the ways geographers currently think and use census and census-related publications. Moreover, undergraduate and beginning graduate geography majors are often not provided with material of this kind which they can turn to for an initial inquiry into census uses. We know that many teachers and college professors frequently use these materials in their classrooms; unfortunately, these activities have not always been shared. Thus it is hoped this volume will serve as a vehicle through which knowledge can be transferred, through which each of us can become more effective teachers and researchers. The purpose of this volume, therefore, is to promulgate the thoughts of many geography professionals on a variety of census and related materials.

With but two exceptions, those papers by Gary O'Dell and John Hunter, the papers included in *Census Data: Geographic Significance and Classroom Utility* are new and have never been published elsewhere. Gary O'Dell's "Beer Consumption" treats a topic not frequently seen and exemplifies a recent classroom activity; John Hunter's "Population Models in the High School" represents an involvement activity unique in mapping that easily justifies its inclusion. The remaining papers reflect a diversity of content, and each author's opinion or prediliction regarding his or her subject matter has been left untouched by the editor.

The material in *Census Data: Geographic Significance and Classroom Utility* is arranged so that topic-related activities follow essays that treat the various government publications. Six specific censuses are dealt with in the pages that follow: Population, Housing, Business, Mineral Industries, Agriculture, and the Canadian Census of Population. Several essays treat publications produced by the Census Bureau and that use data aggregated by that office, but are not official U.S. Census documents. The *U.S. Statistical Abstract, County and City Data Book,* and *Historical Statistics of the United States, Colonial Times to 1957,* are the ones in this group. Several publications, although not censuses, are included because of recent geographical interest in their topics; these are *U.S. Vital Statistics, The F.B.I. Uniform Crime Reports, America Votes,* and the *Minerals Yearbook.* The last pages of the volume are devoted to a discussion of the GE-50 Series maps produced by the Department of Commerce. A few thoughts are

included also on the relevance for teachers of the *National Atlas of the United States of America.*

The classroom activities that are presented in the volume are timely and involve students in many different ways. Map and graph preparation, discussion, simulation, role-playing, and research situations are all incorporated in the various teaching lessons. Teachers will get many ideas from these most interesting and searching classroom materials. Current topics, such as gasoline usage, crime, coal, and electoral geography, are brought into focus in these activities. Agricultural field experiences, political decisions regarding the land-use map, and population fertility round out the offerings presented in the activity papers.

No single volume of this length could ever hope to provide discussions on every publication of the Census Bureau. Notable exclusions are the Censuses of Manufactures, Governments, and Transportation. These omissions were not oversights; they were excluded only because of time and length constraints. The editor assumes the responsibility for these and other exclusions that may exist.

Because of the rapidity with which the Bureau of the Census alters its formats and publications, a few comments must be made concerning changes that have been incorporated since the editor received the original manuscripts. The most important of these are the new formats for the earlier *Censuses of Business.* Commencing with 1972, the reports included in this group of material appear under a new publication title called the *1972 Economic Censuses.* Professor Epstein ("The Census of Business") contributed his paper prior to the publication delivery schedule of the 1972 materials, as he notes. The *1972 Economic Censuses* includes programs for each of the following: Retail Trade, Selected Service Industries, Wholesale Trade, Construction Industries, Manufactures, Mineral Industries, Transportation, Enterprise Statistics, and Outlying Areas.

Each of these divisions of the *1972 Economic Censuses* contains various volumes or reports of a specific nature. For example, the Census of Manufactures is composed of five volumes (I – Summary and Subject Statistics, II – Industry Statistics, III – Area Statistics, IV – Location of Manufacturing Plants, and V – Production Indexes). The researcher who anticipates using these censuses is fortunate, however, in having a *Mini-Guide to the 1972 Economic Censuses.* This volume contains information on the data collected, geographic areas from which the data have been tabulated, and descriptions of the Standard Industrial Classification System (SIC). This reference work is obtainable from the Publica-

tions Distribution Section, Social and Economic Statistics Administration, Washington, D.C. 20233.

Teachers who will use census materials in the classroom for the first time may find the task tiresome. A perusal through census volumes, for the uninitiated, is a challenge. Users can easily become dismayed by the amount of printed material before them. The various volumes, reports, special publications, and other compendia are complex. The reader of *Census Data: Geographic Significance and Classroom Utility* will find little discussion regarding computer tape delivery programs and use of microfilms. As most teachers will have greater accessibility to the ink-paper format versions of the U.S. Census publications, no discussions in the volume involve the highly technical aspects of other forms of census materials.

This volume contains few essays of a rigid technical nature. Column headings, tables of available items, and sampling programs are not generally included. The researcher and/or teacher who wishes to delve to a much greater depth in these matters will find U.S. Bureau of the Census, *Bureau of the Census Catalog of Publications: 1790-1972* (Washington, D.C., 1974) a *most* useful source of all census publications within these dates. The teacher and researcher is encouraged to look at this recent publication for details and reference notes from the census. Most of the material is annotated which makes the *Catalog* one of the most useful guides to sources, and should cause it to be included in a researcher's private library.

Of course this volume has come about through the efforts of many. I wish to express thanks to the Department of Geography, Georgia State University, for its kindly support for final map drafting and manuscript typing. Miss Janet Arnold, the typist upon whom the final typing rested, and who persisted through my aberrant working styles, deserves a kind word. Her cheerful devotion to the task was unprecedented. Most of all, of certainty, credit and courtesy is extended to the many authors who have made the volume possible. Without their contributions and willingness to work under often difficult time constraints, the volume would not have been completed. I have met many great geographers and teachers as a result of my association with them on this project. They are the true champions. I am also indebted to the National Council for Geographic Education for allowing me to work with them on what I consider to be a most fruitful venture. I would also like to express thanks to Ms. Cynthia Taeuber and the Data Access and Use Laboratory of the Bureau of Census for their invaluable assistance. Ms. Taeuber coordinated the checking of

many details for me, and on more than one occasion obtained materials that helped me in the editorial task.

Thanks are extended to all concerned. Editorial errors and omissions, of course, are mine.

Borden D. Dent
Georgia State University
December, 1974

FOREWORD

The National Council for Geographic Education is pleased to present *Census Data: Geographic Significance and Classroom Utility*, the second of the NCGE Pacesetters in Geography, a new series of books especially designed for teachers. Census data can be a valuable source of information and ideas for geography and social studies teachers and their students, but faced with volume after volume, page after page, and column after column of statistics, the teacher – and even the researcher – too frequently turns away in frustration. With the hope of making census data less formidable, the authors of the essays and classroom activities in this volume have shared their thoughts and classroom experiences on using a variety of United States and Canadian census and related materials. The National Council for Geographic Education anticipates that this volume, presented as a pacesetter in the use of census data, will lead the innovative teacher to design a variety of other classroom activities and asks that these activities then be shared through the *Journal of Geography* and other NCGE publications.

The National Council for Geographic Education is proud of the Pacesetter Books, as represented by *Africa: Teaching Perspectives and Approaches*, published early in 1975, and now *Census Data: Geographic Significance and Classroom Utility*. We acknowledge our debt to all persons who have contributed of their time, knowledge, and experiences to make these volumes and the series possible. Other interesting and pacesetting volumes are under way or in the planning stage.

It is a privilege to include in this Foreword a note of appreciation for all who are dedicated to the teaching of geography, at whatever age level and in whatever context. It is for you that the Pacesetter Books have been written and are dedicated. May they serve you well.

ELIZABETH EISELEN, President
National Council for Geographic Education

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1

The U. S. Bureau of the Census

ROBERT L. HAGAN
Deputy Director, U.S. Bureau of the Census

The Bureau of the Census is often described as the "fact finder" for the Nation. In a sense, it might also be described as the "record keeper" for the Nation in that the statistical reports which are the principal product of the Bureau's data collection activities provide a record not only of the number of people in the United States but also of the changes in the characteristics of the population, farms, manufacturing establishments, and retail stores and other businesses in which Americans make their livings. The Bureau occupies a unique place in the Federal statistical program because it publishes more statistics, covers a wider range of subjects, and serves a greater variety of statistical needs than any other Federal Government agency.

The Bureau has presented statistical data since our country's very early years. By law the Census Bureau is responsible for taking the following censuses:

Census	*Periodicity*	*Recent Censuses*	*Next Census*
Population	10 years	1960, 1970	1980
Housing	10 years	1960, 1970	1980
Agriculture	5 years	1969, 1974	1979
Business	5 years	1967, 1972	1977
Construction Industries	5 years	1967, 1972	1977
Governments	5 years	1967, 1972	1977
Manufactures	5 years	1967, 1972	1977
Mineral Industries	5 years	1967, 1972	1977
Transportation	5 years	1967, 1972	1977

Since many users need information more frequently than every five or ten years, and more promptly than data from a full-scale census can be tabulated, the Bureau gathers and reports statistics on many census subjects in the form of current reports

covering population, manufacturing activity and commodity production, retail and wholesale trade, state and local government finances, and housing characteristics and vacancies. These reports are published at different intervals: annually, quarterly, or monthly. One report on retail trade is issued weekly. The Bureau is also responsible for tabulating and publishing the official statistics on the foreign trade of the United States, and issues monthly, quarterly, and annual reports in this field.

Publications of the Bureau include a number of significant compendia covering current data for various levels of government and census defined statistical areas. The *County and City Data Book* gives statistical information for counties, cities, and standard metropolitan statistical areas. The *Congressional District Data Book* gives separate data on population, housing, and election statistics, and is issued after each decennial census. *County Business Patterns* presents statistics for each county by state on the number of employees, taxable wages, total number of reporting units, and number of reporting units by employee size class, classified by significant kinds of business in the country.

Another major publication of the Bureau is the *Statistical Abstract of the United States* which is the standard summary of statistics on the social, political, and economic organization of the United States. It has been published annually since 1878. Annual statistics for the Nation as a whole covering a wide range of socio-economic data are provided in the *Historical Statistics of the United States, Colonial Times to 1957*. A most useful monthly publication prepared by the Bureau which should be called to the attention of all geographic researchers is *Data User News* (formerly *Small-Area Data Notes*). It is issued for users of census materials and lists availability of new publications of interest to the researcher. It is available from the Publication Distribution Section, Social and Economic Statistics Administration, Washington, D.C. 20233.

THE ROLE OF THE GEOGRAPHY DIVISION

Since all of the Bureau's major programs provide data by geographic area, from the level of the city block for the population and housing censuses up to the United States as a whole, the work carried out by the Geography Division is of primary importance. The Division is involved in four major programs: map preparation, statistical area definition, geographic coding, area measurement.

MAP PREPARATION

The Geography Division is responsible for the preparation of maps for use in conducting censuses and surveys and for the presentation of their results. For example, in connection with the *1970 Census of Population and Housing*, the Division prepared prior to April 1, 1970, more than 26,000 maps covering all counties and places in the United States, plus almost 140,000 individual enumeration district maps for use of the census enumerators. The 1970 census publication maps included a United States map showing county boundaries, state maps showing townships or census county division boundaries, tract boundary outline maps, and maps identifying every block for which data was published in the block statistics reports.

A multi-colored United States statistical map series at a scale of 1:5,000,000, initiated after the 1960 census, was continued with twenty maps published to date based on 1970 census data. This is the U.S. GE-50 Series. These maps provide comparative and current socio-economic information on a county basis. Recently, the first in a smaller version of the multi-colored statistical maps series at 1:7,500,000, the U.S. GE-70 Series, was begun with the publication of a nighttime view of the population distribution of the United States.

STATISTICAL AREA DEFINITION

The definition of statistical areas used in tabulating statistics is another program of the Geography Division. Both because of data collection requirements and the need for publishing data for specific identifiable areas, the Geography Division defines many different types of geographical statistical areas: census county divisions, urbanized areas, census tracts and blocks, incorporated and unincorporated places, central business districts, and major retail centers among others. Standard metropolitan statistical areas, for which the Bureau provides a wide range of statistics, are defined by the Office of Management and Budget, Executive Office of the President.

GEOGRAPHIC CODING

Developing geographic coding systems that can allocate the information collected in a census or survey to all the geographic areas for which statistics might be tabulated is also a primary function of the Geography Division. The coding system used for the *1970 Census of Population and Housing* is published in the PHC(R) Series, "Geographic Identification Code Scheme." An

important new facet of the Division's work is the development of a computerized geographic coding system which assigns geographic codes to street addresses. Called the Geographic Base (DIME) File, the files are available for use locally to assign geocodes for many other programs besides those involving census data. The Geography Division's GE-60 series of reports contains descriptions of these files, and their use and maintenance.

AREA MEASUREMENT

Measurements of land and water areas are compiled by the Geography Division with the aid of electronic equipment. These geographic measures are principally important in the computation of densities. Land and water areas are tabulated and appear in many of the Bureau's publications.

PUBLICATIONS OF THE GEOGRAPHY DIVISION

Several *Urban Atlases* (a new GE-80 Series) are being produced. Among those already published are the atlases for Providence, Rhode Island; Louisville, Kentucky; Fort Worth, Texas; and Anaheim, California. These publications present a series of computer-prepared colored maps, showing a comprehensive set of demographic data for each tract located within each standard metropolitan statistical area (SMSA). Eventually one *Urban Atlas* will be produced for every SMSA in the United States. The maps are prepared by merging on the computer a set of digitized tract boundaries and the 1970 census tract data. The output maps are "drawn" by the computer on microfilm; these films are then enlarged to final map publication size. Copies of the digitized files and tract data tapes will be available to local public and private agencies at cost to enable local data users to prepare maps highlighting their areas of interest efficiently and economically.

Other publications for which the Geography Division has responsibility include the issuance of *Census Tract Memos*. This series, initiated in 1960 and issued irregularly, describes the Bureau's tract and other programs to census tract committees and other potential users. The *Census Tract Papers*, GE-40 Series, give applications of small area data. This series provides the papers presented at the Conference of Small Area Statistics of the American Statistical Association conventions held annually to discuss the problems and use of census tract and related small-area data. The *Census Tract Manual* is in its fifth edition and acts as a guide for tract committees engaged in developing census tracts.

The *Boundary and Annexation Survey*, issued for the first time in 1972, lists all newly incorporated communities and shows boundary and annexation changes of all incorporated places with population of 2,500 or more that have taken place during calendar years 1970 and 1971. An updated version, the *1973-74 Boundary and Annexation Survey*, published in early 1975, carries this new series through 1974.

The Bureau of the Census offers a wide variety of published materials that are readily available to research and teaching communities. Information covering the full detail of publications and maps is available from the Bureau of the Census, Washington, D.C. 20233, at no cost. However, copies of the printed publications and maps must be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

2

The Statistical Abstract of the United States And The County and City Data Book

JOHN FRASER HART
University of Minnesota

The *Statistical Abstract of the United States*, which has been published each year since 1879, is the standard summary of social, economic, and political statistics for the United States. As a geographer, I find that most of the data published in the *Statistical Abstract* are not very useful – and I consult it constantly. Its primary emphasis is on data for states, regions, or the entire nation; these units of area are too large to be very useful geographically, but geographers have learned to use the *Statistical Abstract* as it is used by good librarians, as a "finding guide" to the incredibly rich treasure trove of statistical data available from more than 200 government, private, and international agencies.

Most of our states are so large that a single statistic for the entire state may not be very useful. The state of Virginia, for example, includes the sprawling suburbs of the nation's capital, the brawling and bustling naval bases of Hampton Roads, the proud and genteel Capital of the Confederacy, the tired tobacco fields of the Southside, the lush limestone pastures of the Valley, and the grim depressing coal camps of the Southwest; no single statistic can adequately represent the enormous social, economic, political, climatic, or geological diversity of the state. Virginia, moreover, is one of the smaller states; California is big enough to make three of Virginia, with enough left over to make another Indiana. The entire state of Rhode Island is not much larger than an average county in Texas, and comparing figures for Rhode Island and Texas is a bit like comparing mice and elephants.

Many geographers, especially those interested in cities, find that the most useful data in the *Statistical Abstract* are tucked away at the very end, where you are not likely to find them unless you look. Each year since 1967 the final section has presented a

selection of statistics for the nation's largest standard metropolitan statistical areas (SMSAs); the 1973 edition, for example, contained data on 200 items for each of the 157 SMSAs which had at least 200,000 people in 1970. Another useful selection of data, for anyone who teaches world geography, is also tucked away near the end; the section on "Comparative International Statistics" summarizes industrial, social, and agricultural data for most of the member countries of the United Nations.

The great majority of geographers, however, find the *Statistical Abstract* most useful as a "finding guide" to other statistical publications and sources of more detailed information about the subject(s) in which they are interested. For example, each of the more than 1,350 tables in the 1973 edition has a footnote which indicates the source(s) of the information it contains; the publications cited as sources usually contain more detailed information, and most of them discuss the definitions and concepts used in collecting and tabulating the data.

The tables in the 1973 edition are arranged into thirty-four sections; each section has an introductory text, many illustrated by a graph or two, with a more general discussion of sources. Still more information is provided in an Appendix, "Guide to Sources of Statistics," which lists more than eight hundred statistical publications on fifty major subjects, briefly discusses the publications of recent censuses, and concludes with a bibliography of the most recent statistical abstracts published for each state and Puerto Rico.

Each edition of the *Statistical Abstract* is slightly different from those which have preceded it. The contents are reviewed each year by the Statistical Compendia Staff of the Bureau of the Census, which is responsible for compiling the volume. Data are updated, new tables and graphs of current interest are added, and less useful data are curtailed or eliminated. The Director of the Bureau of the Census is always interested in receiving suggestions for the improvement of future editions.

One of the major "improvements" which has been made in the *Statistical Abstract* since the Second World War has been the publication of separate volumes which supplement it in various ways. The *County and City Data Book* contains detailed information for cities, counties, and other geographical units smaller than states. The name of the *Congressional District Data Book* is self-explanatory, as are the names of the *Directory of Federal Statistics for Local Areas*, the *Directory of Federal Statistics for States*, and the *Directory of Non-Federal Statistics for States and Local Areas*. Many social and economic time series for the nation

as a whole have been assembled in *Historical Statistics of the United States, Colonial Times to 1957*. The *Pocket Data Book* summarizes a wide variety of data in graphs and tables for quick and easy reference.

Geographers generally make the greatest use of the *County and City Data Book*, which summarizes data from the most recent censuses of population, housing, governments, manufactures, business, mineral industries, and agriculture, plus a variety of other sources, for each county, major city, urbanized area, SMSA, state, Census division, Census region, standard federal administrative region, and the United States.

The first *County Data Book*, which was published in 1947, contained information on 91 items. In 1949 the *County Data Book* was combined with the *Cities Supplement*, which had been issued in 1944, and the number of items was increased to 92 for cities and to 101 for counties, metropolitan areas, and states. By 1967 the list of unduplicated items had been increased to a total of 224. These items are presented in each table in the same sequence, but the tables for different types of areas have slightly different sets of items, because some data are not available for some types of areas, some items are more important in one type of area than in another, and some items are not even applicable to some forms of areas; few people have much interest, for example, in data on mining or farming in New York City or San Francisco.

The list of items for which data are presented in the *County and City Data Book, 1972*, is mind-boggling: area (1 item), population (21), education (11), labor force (17), families (4), income (25), housing (35), the vote for president (2), government finances and employment (20), crime (5), banking (3), manufacturing (12), retail trade (19), selected services (15), wholesale trade (6), mining (4), rural population (5), agriculture (24), hospitals (3), and climate (7).

Table 1 has data on 196 items for the United States, census regions, census divisions, states, and standard federal administrative regions. Table 2 has data on the same 196 items for each of the 3,069 counties and 72 county equivalents in the United States. The last thirty-three items, on mining and agriculture, are omitted from Table 3, which presents data for SMSAs. Every SMSA, by definition, must include a city of 50,000 or more people, and it must consist of one or more entire counties (except in New England, where people think in smaller terms, and SMSAs are defined on the basis of minor civil divisions). Anyone who desires data on mining and/or agriculture in a particular SMSA can merely turn to Appendix D (which lists the counties included in

each SMSA, and extract the data for those counties from Table 2).

Table 4 in the *County and City Data Book, 1972*, contains data on 99 items for urbanized areas. Statisticians detest urbanized areas, because they change in size from census to census, and the data from one census are not comparable with data from others. Anyone who is more interested in cities than in intercensal data comparability, however, should be delighted with urbanized areas, because the urbanized area is the best approximation of the real built-up area of the city at any given time, and it changes constantly only because the city itself is constantly changing. Urbanized areas are defined only for cities which have 50,000 or more people; each one includes the city and the surrounding built-up fringe areas which have at least 1,000 people per square mile. Unlike SMSAs, which consist of entire counties and contain considerable nonurban land, the urbanized area is the actual built-up area of the city; for example, the urbanized area of Peoria, Illinois, in 1970 covered 107 square miles and had a population of 247,121, whereas the Peoria SMSA contained 1,803 square miles but had only 341,979 people.

Table 5 contains data on 99 items for an unusual group of 76 "places" which had more than 25,000 people in 1970 but had never become incorporated as political units. Many of these places were on the suburban fringes of rapidly expanding cities, but a few were military bases. Table 6, which contains data on 194 items for each incorporated city with 25,000 or more people in 1970, is followed by a useful set of Appendices, and the final pages of the volume contain maps which show the counties and major cities of each of the states.

3

Beer Consumption

GARY O'DELL
Oak Park High School
Kansas City, Missouri

Man has had a long association with alcoholic beverages. In some form they are present in almost every society, often used for social, religious, and medicinal purposes. In the United States, one alcoholic beverage, beer, is the product of a six million dollar industry. The purpose of this essay is to demonstrate an exercise through student inquiry, which develops the patterns and trends of beer consumption in the United States. The activity commences with locating the geographical places where beer is consumed, and considers the direct and indirect influences of such factors as ethnic preferences, income growth, and aggressive advertising. Students will be provided with data of per capita income for the years 1949, 1959, and 1969. The statistics will be used to develop maps and graphs. These three instruments (data, maps, and graphs) will be useful in the development of skills such as data classification, map analysis and construction, graph analysis and construction, and concepts associated with correlation, areal association, and threshold.

ACTIVITY I – DATA INTERPRETATION

Objectives: (1) to introduce students to the statistical data on per capita beer consumption and per capita income, and (2) to classify data into a more useful form.

Materials: Table 3-1. Per Capita Beer Consumption and Income; Figure 3-1. Scattergraph showing Per Capita Beer Consumption and Income.

Reprinted, with changes, from the *Geographical Bulletin*. The original paper was prepared while the author was in an institute program supported by NSF at Oregon College of Education.

TABLE 3-1
PER CAPITA INCOME AND BEER CONSUMPTION

	1949		1959		1969	
	Beer Consumption (gallons)	*Income (dollars)*	*Beer Consumption (gallons)*	*Income (dollars)*	*Beer Consumption (gallons)*	*Income (dollars)*
Alabama	*4.0	773	*4.9	1,409	*8.8	2,650
Alaska	NA	NA	14.3	2,550	16.6	4,249
Arizona	14.4	1,165	16.0	1,959	*21.0	3,287
Arkansas	*5.4	778	*6.5	1,322	*10.6	2,594
California	15.2	1,665	15.7	2,661	17.7	4,232
Colorado	14.8	1,386	13.5	2,123	18.1	3,495
Connecticut	20.6	1,591	16.8	2,817	16.3	4,595
Delaware	18.9	1,675	15.7	2,946	19.0	4,107
Dist. of Columbia	*23.0	1,820	*18.8	2,943	*22.8	4,945
Florida	13.0	1,102	13.5	1,980	17.7	3,372
Georgia	*4.6	876	*5.3	1,553	*11.4	3,132
Hawaii	NA	NA	9.3	2,139	14.5	4,163
Idaho	16.9	1,221	12.4	1,782	17.4	2,999
Illinois	*22.2	1,618	17.6	2,610	19.1	4,288
Indiana	16.5	1,290	15.0	2,102	16.0	3,669
Iowa	15.7	1,292	14.1	1,953	16.8	3,519
Kansas	*10.4	1,210	*9.0	1,994	*12.7	3,621
Kentucky	13.1	865	11.4	1,514	14.3	2,877
Louisiana	13.9	1,002	12.9	1,575	17.3	2,877
Maine	14.2	1,087	14.6	1,768	19.3	3,011
Maryland	*22.9	1,401	*20.2	2,343	20.7	3,965
Massachusetts	19.4	1,417	16.6	2,444	18.7	4,022
Michigan	*25.1	1,443	*20.4	2,253	*21.3	3,987
Minnesota	19.6	1,227	16.0	1,962	17.5	3,579
Mississippi	*4.7	634	*4.8	1,162	*11.5	2,347
Missouri	18.6	1,286	16.1	2,145	18.1	2,467
Montana	19.9	1,390	18.6	1,955	*22.3	3,130
Nebraska	17.0	1,294	15.8	1,981	20.4	3,548
Nevada	21.3	1,731	*22.9	2,745	*27.6	4,244
New Hampshire	20.1	1,195	*18.8	2,010	*25.6	3,437
New Jersey	*24.1	1,546	*20.2	2,608	19.0	4,272
New Mexico	10.4	1,033	13.1	1,833	17.7	2,848
New York	*23.5	1,758	*19.7	2,736	19.6	4,495
North Carolina	*4.3	854	*4.9	1,485	*10.4	2,987
North Dakota	14.5	1,202	13.5	1,526	18.5	2,982
Ohio	*22.0	1,436	17.4	2,328	18.2	3,801
Oklahoma	*9.4	1,068	*9.1	1,786	*11.9	3,087
Oregon	18.9	1,448	13.8	2,171	18.7	3,521
Pennsylvania	*23.7	1,416	*20.1	2,222	*20.7	3,678
Rhode Island	*24.5	1,403	*19.9	2,156	*21.9	3,771
South Carolina	*4.8	787	*5.4	1,332	*11.4	2,731
South Dakota	12.4	1,174	11.0	1,476	14.3	2,986
Tennessee	*8.4	873	*7.3	1,521	13.1	2,871
Texas	13.2	1,205	14.2	1,908	20.2	3,301
Utah	11.4	1,213	*7.9	1,848	*10.5	2,961
Vermont	15.7	1,075	16.0	1,789	*21.7	3,262
Virginia	*9.3	1,039	10.9	1,816	16.3	3,347
Washington	16.8	1,469	14.6	2,271	18.8	3,916
West Virginia	11.7	998	9.2	1,635	*12.6	2,712
Wisconsin	*27.7	1,329	*24.7	2,116	*28.2	3,512
Wyoming	15.4	1,481	13.5	2,149	19.2	3,261

*Ten highest and ten lowest states on consumption of beer.

Sources: "Per Capita Consumption of Malt Beverages," *Brewers Almanac*, (New York: United States Brewers Association, Inc., 1960), Table 41, p. 54, and (1970), Table 46, p. 59. U.S. Bureau of the Census, "Per Capita Income Payments to Individuals," *Statistical Abstract of the United States, 1951* (Washington, D.C.: Government Printing Office), Table 310, p. 258; *1959*, Table 419, p. 307; *1971*, Table 497, p. 314.

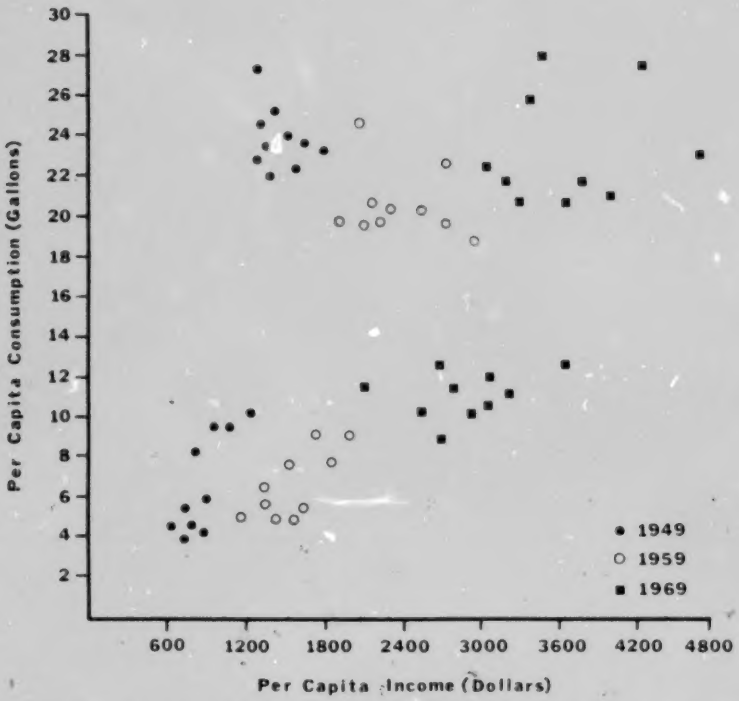

Figure 3-1. Relationship between Per Capita Beer Consumption and Income, using the ten highest and ten lowest states in consumption for each time period.

Procedures: (1) Distribute per capita beer consumption and per capita income data to the students and allow them to familiarize themselves with the data. In order to guide their study of the data, you might wish to ask the following questions: What is the meaning of the average annual per capita consumption? Answer: It is the average amount consumed per person in a given unit (state) for one year. What is the meaning of average annual per capita income? Answer: It is the average amount earned per person in a given unit (state) for a year. Why are the beer statistics presented in "state" units? Answer: Alcoholic beverages are carefully monitored by the states for tax purposes. (2) Using the data, have the students list the ten highest and ten lowest states in beer consumption for 1949. (3) The teacher may wish to ask questions such as: Where are the highest ten states in beer consumption? Answer: The Northeast and Nevada. What are the relative distances between the top ten states? Answer: Nine of the states

are located close together in the Northeast, but Nevada is in the Far West. Why is Nevada in this group but far away in distance? Answer: Large numbers of tourists go to Nevada which results in a high beer consumption, but the tourists are not included in the total population. What relationships exist between high beer consumption and high per capita income? Answer: There is at least a high positive "statistical" correlation (Fig. 1) between high beer consumption and high per capita income. States with higher income levels tend to consume a larger amount of beer. What relationship exists between low beer consumption and low per capita income? Answer: Again there is a high positive "statistical" correlation (Fig. 1) between low beer consumption and low per capita income (Alabama – lowest consumption rate and lowest per capita income). These relationships will be more fully developed in Activity III.

ACTIVITY II – AREAL DISTRIBUTIONS AND ASSOCIATION

Objectives: (1) to develop map preparation and interpretation skills (choropleth maps), (2) to develop concept of areal associations, and (3) to more closely correlate patterns of income and consumption.

Materials: Table 3-1 (from previous activity); Table 3-2:

TABLE 3-2
CLASSES TO BE USED FOR MAPPING

Per Capita Consumption of Beer (Gallons)		
1949	*1959*	*1969*
20.0 and over	20.0 and over	25.0 and over
17.5 – 19.9	16.0 – 19.9	19.0 – 24.9
15.0 – 17.4	14.0 – 15.9	17.0 – 18.9
12.0 – 14.9	11.0 – 13.9	13.6 – 16.9
Under 11.9	Under 10.9	Under 13.5

Per Capita Income Payments to Individuals (Dollars)		
1949	*1959*	*1969*
1,500 and over	2,500 and over	4,200 and over
1,250 – 1,499	2,075 – 2,499	3,550 – 4,199
1,000 – 1,249	1,651 – 2,074	2,900 – 3,549
Under 1,000	Under 1,650	Under 2,899

Classes to be Used for Mapping; blank state outline maps of the United States.

Procedures: (1) Distribute Tables 3-1 and 3-2 and the state outline maps, (2) It is suggested that the students be divided into two groups. One will work with the 1949 data, while the other group works with the 1959 data. Each group should complete two maps, one for income and one for beer consumption for its time periods. (3) Discuss the ideas of choropleth mapping and the legends specified in Table 2. (4) Determine by using the data the map class appropriate to each state value. For example, Arizona for 1949 consumed 14.4 gallons per capita. Since 14.4 falls within the 12.0-14.9 class, the color or pattern for this class is to be used to illustrate Arizona on maps. The teacher may wish to illustrate the above by showing the students completed map examples. (5) Direct students to select five colors or patterns which are distinct enough to show transition from one class to another. Suggest that the color or patterns should vary in intensity with the increase in numerical value for the class. (6) Upon completion of these maps (1949 and 1959, consumption and income), the respective groups should present to each other their observations as well as their concepts as to the patterns illustrated on these maps.

Some of the things they should observe regarding consumption are: high consumption patterns of the Northeast and of Nevada, relatively low consumption patterns in the South, and the similar skewing of patterns of per capita consumption and per capita income. With an increase in income there is a corresponding increase in consumption. An unusual pattern exists with Illinois. In 1949 it was among the highest in beer consumption and then dropped out of the top ten in 1959, but in per capita income, Illinois retained its high position. Note that the consumption rate for Utah is low for 1949 and 1959, a factor attributable to the religious influence in the area; however, its per capita income increased between these two dates. There is a zone of marked contrast in beer consumption between West Virginia-Virginia and Pennsylvania-Maryland. Regarding per capita income one observes a less distinguishable gradation. The students may be requested to analyze regional patterns more closely for correlations.

For consumption in 1959 there are thirteen states in the low (under 11.9) category. For the same year there are nine states in the low (under $1,000) income category. In these two groups there are only a few variations. Virginia, Oklahoma, Kansas, New Mexico, and Utah are the only states for low consumption which do not appear in the same category for income in 1959. However, it should be noted that all of those five states are in the next

lowest income category ($1,000-1,249). The process of isolating categories on the maps and dealing exclusively with the resulting patterns will yield additional regional characteristics.

ACTIVITY III – "SCATTERGRAPH"

Objectives: (1) to integrate and correlate map skills into a single graphic form, the scattergraph, and (2) to analyze the distribution of the scattergraph and to observe marked change in the variables, the phenomenon of threshold, and areal associations.

Materials: Graph paper to make scattergraphs, Tables 3-1 and 3-2, blank state outline maps of the United States.

Procedures: (1) Students should already have Tables 3-1 and 3-2. (2) Students are to map the per capita consumption beer patterns for 1969 using the skills developed in Activity II. (3) Students should compare their 1969 maps with the 1949 and 1959 counterparts. Special note should be made that the national and regional patterns are "weakening" and the correlations between the two maps are much less than in 1959 and especially in 1949. (4) The following partial list of factors that affect consumption may suggest points to be developed in a class discussion: consumption for wine, spirits, and soft drinks; ethnic group preference; increased availability; individual income growth; changes in social values and laws (for example, lowering or raising the drinking age); shift of public attention away from beer to the drug crisis; moonshine and illegal manufacturing which would not appear on the consumption statistics; aggressive advertising and the changing image of beer; effect of war, strikes, or crop failures; loyalty to local beer industry; shifting age factor for consumption of beer; religion (the "Bible Belt," Mormons of Utah); market outlets such as grocery stores, drug stores, or filling stations.

Next, (5) distribute graph paper on which students will draw a scattergraph. Using the statistics for per capita income and consumption for 1949, 1959, and 1969, students are to plot the relative location for each of the top ten states in each of the time intervals. For example, Rhode Island in 1949 had a per capita consumption of 24.5 gallons and a per capita income of $1,403. Converging these two values on the graph will give the relative location of Rhode Island. Distinguish the time intervals by using different colored dots on the graph (1949 dots red, 1959 dots blue, 1969 dots black). After completing the scattergraph the teacher may want to make a transparency of the scattergraph for the overhead projector to aid in the discussions and to allow each student to check the accuracy of his own graph.

A scattergraph is a useful data array for measuring correlations or associations. Figure 1 shows the ten high and ten low states for consumption for each period. The students should place all states on their graphs – the correlation coefficient between these data for 1949 is +.82, for 1959, +.71, and for 1969, +.49. Note should be made that the trends of the dots for these years are markedly different. The high positive correlation for 1949 begins to weaken in 1959, and in 1969 falls to such a level that only speculative comments can be made about it. This same pattern is evident on the six maps.

The changing correlations are associated with many socio-economic changes in the United States, including rapidly rising incomes of the 1959-1969 period. It is also related to the maximum capacity of a person for beer. Our first major thought, for example, should be that with increasing incomes there is increasing beer consumption. We cannot assume, however, that a person earning $1,000,000 per year will consume 1,000 times as much beer as a person earning $10,000 per year. Hence there is a "threshold" beyond which the relationships between the variables change – this is indeed evident here. (6) Ask the students what observations can be made from the scattergraph. You may want to ask these questions: What advantage does the scattergraph have over the choropleth maps? Answer: You can see the correlations of all six maps (1949, 1959, and 1969 Per Capita Consumption of Beer, and Per Capita Income) integrated and quantified. Is there indicated on the scattergraph an upper limit to the amount of beer that people will drink? Answer: Yes. What is the average upper limit for consumption? Answer: Twenty-eight gallons per capita. Are the dots grouped regionally? Answer: Yes, throughout the three intervals there is a clustering of the southern states. What factors cause the separation of the southern states from the northern states? Answer: As the income increased for both regions, only a moderate increase in beer consumption took place (Georgia 1949 income of $876 per capita and consumption of 4.6, 1959 income of $1,553, beer consumption 5.3). Between these two periods there was almost a 100 per cent increase in income and yet only a 25 percent increase in beer consumption indicating the people bought other things besides beer. What reasons could account for the decline of beer consumption in the 1959 portion of the graph in the Industrial North? Answer: The recession in 1958-1959 contributed to this decline.

CONCLUSION

In completing these activities the student should acquire a visual perspective of beer consumption and its interrelated social, economic, and environmental factors, and also develop skills in data classifications, areal associations, and in the integrating of maps and graphs for use in additional geographical studies.

4

A Short Description of the Census of Population and Related Publications

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The Census of Population is the oldest census in the United States, established and authorized by Congress and pressed into law as Article I, Section 2, of the United States Constitution. First taken beginning in August of 1790, it has persisted as a decennial census since that time. Indeed, its delivery record stands as the most regular of all the American censuses. It is remarkable, too, as an historical inventory of our changing society and cultural attitudes; it mirrors our occupational, mobility, and economic changes, and fortunately for the researcher, records these data so that geographical patterns and trends can be investigated.

Two years after the 1790 census was begun, Thomas Jefferson forwarded to the President the results of that first census. The number of free white males of sixteen years and older, those under sixteen, free white females, and other free persons, and the number of slaves formed the first decennial population census. It is a far cry from the kinds of data collected in, say, 1960, when sex, race, place of birth, marital status, educational attainment, times married and date of first marriage, employment status, occupation, place of work, means of transportation to work, income, and many, many other items were collected.

By 1800 the U.S. Census had expanded to include demographic data on the number of free white persons under 10 years of age, and in four other age groups, 10-16, 16-26, 26-45, and 45 and over. It also included information on certain Indians. The census taken in 1830 began a five-year age group break-down for free whites up to twenty, and ten-year groups from twenty to 100; persons over 100 were also recorded. The number of blind persons and foreigners not naturalized were also a part of this census. The number of persons employed in major economic activities was

added in the 1820 census, and data on occupation in the 1850 census. Information concerning insane and idiotic persons was first collected in the 1840 census. Literacy tabulations were begun with the 1840 census.

Chinese and Indians were included in the race categories by 1850, where formerly (back to 1840) only white, black, or mulattos were recorded. The censuses taken in 1870, 1880, and 1890 are the forerunners of today's voluminous reports prepared by the Bureau. These were composed of fifteen separate volumes, including, to name a few, Volume 1 – Population of the United States, Volume 2 – Report on the Insane, Feeble-Minded, Deaf and Dumb, and Blind in the United States, Volume 3 – Report on Crime, Pauperism, and Benevolence in the United States, Volume 6 – Report on Manufacturing Industries in the United States, and Volume 9 – Report on Statistics of Churches in the United States. Demographic and social aspects had by this time expanded to include some twenty-five and more items. Chronic disease sufferers were tallied.

From the time of the Twelfth Decennial Census (1900) to the Nineteenth (1970), numerous population items were either added or dropped. Geographers have found Volume I – Characteristics of the Population, and Volume II – Subject Reports, most useful. Among the characteristics of the population that one can find in Volume II are national origin and race, families, marital status, fertility, migration, education, employment and unemployment, occupation, income, and industry.

The amount of material gathered for the *1970 Census of Population* is staggering. No one can appreciate its length until he or she turns the pages of these volumes and reports. Table 4-1 summarizes the number of items collected by the Census of Population since 1790 by three categories: demographic, social, and economic. The rapid increase in the number of items in the social area beginning in 1850 is caused by the data collected on the general questionnaire for convicts, fugitives, paupers, and certain physical defects (deaf or deaf mutes, blind, insane, idiotic, ills, and other related items). These items were dropped from the general questionnaire by 1900, and there were relatively few such items on the supplemental questions compared to the immediately preceeding census. The 1890 Census was the first in which language and fertility items were gathered. Most of the economic items in the population census were added in the 1940 Census, although an occupation item was gathered as far back as 1850. The table attests to the magnitude of the 1970 Census, especially when compared to those immediately preceeding it.

TABLE 4-1
NUMBER OF ITEMS COLLECTED ON THE BASIC GENERAL QUESTIONNAIRE BY CENSUS OF POPULATION BY DEMOGRAPHIC, SOCIAL, AND ECONOMIC CATEGORIES, 1790-1970

Year	Category			
	Demographic	*Social*	*Economic*	*Total*
1790	2	1	0	3
1800	3	1	0	4
1810	3	1	0	4
1820	3	2	1	6
1830	3	2	0	5
1840	3	8	1	12
1850	4	13	2	19
1860	4	13	3	20
1870	4	10	3	17
1880	6	9	2	17
1890	6	21	2	29
1900	6	10	2	18
1910	6	14	4	24
1920	5	10	3	18
1930	8	9	4	21
1940	7	13	11	31
1950	8	10	8	26
1960	7	12	10	29
1970	9	17	14	40

Source: U.S. Bureau of Census, *Population and Housing Inquiries in U.S. Decennial Censuses, 1790-1970*, Working Paper 39 (Washington, D.C.: Government Printing Office, 1973), pp. 5-9.

Fortunately for users, there are a number of good census reference works to which they can turn for initial guidance. They are especially encouraged to look at U.S. Bureau of the Census, *Bureau of the Census Catalog of Publications: 1790-1972* (Washington, D.C., 1974) for an annotated list of census materials between these dates. Researchers might best begin with it to single out exact references prior to seeking the actual materials from libraries.

A MATTER OF SCALE

Geographers have always been interested in the size or scale of the reporting units used by the Census of Population. The first decennial census aggregated data by districts (states), counties, and in New England and certain other states, by towns. Data were tabulated by minor civil divisions in the 1830 census, and by

1860, nativity of the free population was tabulated for certain large cities (Boston, New York, Philadelphia, Baltimore, Cincinnati, Chicago, St. Louis, and New Orleans). The *1890 Census of Population* included a new size, that of cities of 25,000 population or more. For 1900, the population was *divided* into rural and urban components. Then in 1910, city classifications of 25,000 to 100,000 and over 100,000 were used for occupational enumerations. The metropolitan district classification appeared in 1932 using results of the Fifteenth Decennial Census.

The describing of metropolitan areas statistically has undergone numerous changes and additions since the earlier metropolitan district idea. The standard metropolitan area was used for the 1950 Census, but this was changed to the standard metropolitan statistical area for the 1960 Census. This form of metropolitan description is still used, although it too was changed somewhat for the 1970 definition. Researchers and teachers must be on the alert for these changes especially when doing temporal comparative studies. The reader can gain insight for the various advantages and disadvantages of each of these classifications by looking at Raymond E. Murphy, *The American City: An Urban Geography*, First Ed., (New York: McGraw-Hill, 1966), especially Chapter Two.

Numerous other areal units have of course been employed by the Census Bureau in its relatively long handling of urban data. The urbanized area first appeared in 1950 and represented the Bureau's attempt to describe the real, built-up city. As Professor Hart has so aptly stated in a previous essay in this volume, the urbanized area definition is an important one for it can be used to ascertain real changes over time in the city's geographical structure and shape.

Urban geographers working at a variety of scales use Census of Population materials frequently and are uniquely interested in the classification programs. At a scale that assumes cities to be points in space, city size as defined by the foregoing definitions are important. The work of both Chauncey Harris and Howard J. Nelson come to mind in this regard.[1] They both worked in the area of city classification, Harris employing the metropolitan district idea and Nelson the urbanized area definition. Maxwell in Canada used incorporated cities for his classification of Canadian cities, and employed Census of Canada data.[2]

[1] Chauncey D. Harris, "A Functional Classification of Cities in the United States," *Geographical Review*, Vol. 33 (1943), pp. 86-99; and Howard J. Nelson, "A Service Classification of American Cities," *Economic Geography*, Vol. 31 (1955) pp. 189-210.

[2] J. W. Maxwell, "The Functional Structure of Canadian Cities: A Classification of Cities," *Geographical Bulletin*, Vol. 7 (1965), pp. 79-104.

Perhaps of equal importance, if not more, are the census units employed at a scale that makes *intra*city study and geographical pattern analysis possible. Perhaps the most widely-used unit is the census tract, an intracity unit first employed widely in the 1940 Census. Census tracts are small geographical units, containing usually about 4,000 people, bounded by streets, railroads, creeks, and similar real features. Their boundaries traditionally remain fixed, so temporal geographical analysis is feasible. They have become widely used in recent years as geographical inquiry into urban phenomena has become more detailed. City blocks are used as well, most often in urban housing studies.[3]

Many urban studies today are centered around the "quality of life," using social indicators, and employ census materials at principally the block and tract levels. Bederman used tract-level data in his quality of life study for Atlanta, Georgia, as he and Adams did for their job accessibility and underemployment paper for the same city.[4] Harold Rose has employed both block and tract information in describing the black ghetto.[5] Other geographical units have also been used; for example, the enumeration district was employed by Dickinson, Gray, and Smith in a recent quality of life-social indicators investigation.[6] There have been numerous geographical studies involving census block and tract data; these have been singled out for their recency and because teachers can easily adapt their ideas into classroom inquiry activities.

Geographers, of course, have found other areal divisions practical in their work. The minor civil division, to mention one, is a frequently-used unit for population mapping.[7] Most counties of the United States are subdivided into these units, which are administrative or political (usually townships), and in those counties where these divisions frequently change, the Census Bureau has substituted for them the census county division. It is

[3] Truman A. Hartshorn, "Inner City Residential Structure and Decline," *Annals*, Association of American Geographers, Vol. 61 (1971), pp. 72-96

[4] Sanford H. Bederman, "The Stratification of 'Quality of Life' in the Black Community of Atlanta, Georgia, *Southeastern Geographer*, Vol. 14 (May, 1974), pp. 26-37; Sanford H. Bederman and John S. Adams, "Job Accessibility and Underemployment," *Annals*, Association of American Geographers, Vol. 64 (1974), pp. 378-386.

[5] Harold Rose, *The Black Ghetto: A Spatial Behavioral Perspective* (New York: McGraw-Hill Book Company, 1971), p. 6.

[6] Joshua C. Dickinson, III, Robert J. Gray, and David M. Smith, "The 'Quality of Life' in Gainesville, Florida: An Application of Territorial Social Indicators," *Southeastern Geographer*, Vol. 12 (November, 1972), pp. 121-132.

[7] Borden D. Dent, "Mapping Georgia's 1970 Population," *Atlanta Economic Review*, Vol. 22 (March, 1972), pp. 45-46.

desirable to work with these small units when developing population dot maps, especially when used with other resources to assist in the mapping technique.

The geographic areas for which data are provided in the 1970 Census are listed in Table 4-2. The researcher and teacher should

TABLE 4-2
STATISTICAL-AREAL UNITS USED
IN THE 1970 CENSUS OF POPULATION

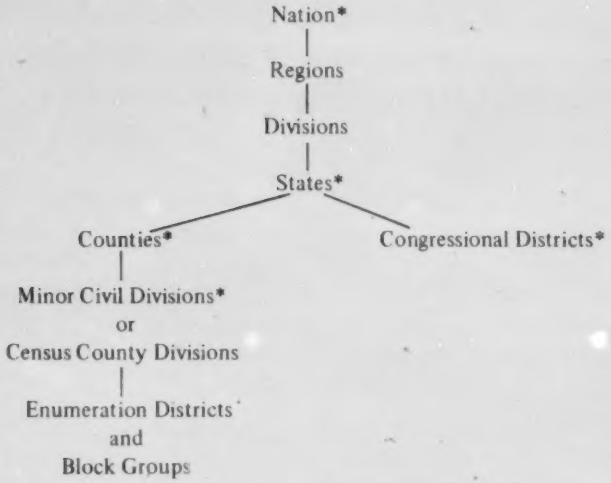
Blocks
Enumeration districts or block groups
Census tracts
Minor civil divisions or census county divisions
All places
places greater than 1,000 only
places greater than 2,500 only
places greater than 10,000 only
Counties
Urban/rural parts of counties
Standard metropolitan statistical areas
Urbanized areas of SMSAs
Components of SMSAs
Congressional districts
Divisions
Regions
Zip Codes

Source: U.S. Bureau of the Census, Data Access and Use Laboratory. "Using Census Data: Concepts, Publications, Computer Tapes, Other Products." An Instructor's Reference Manual, by Cynthia M. Taeuber (Washington, D.C., 1974), p. 10.

be alerted, however, because similar data are not available throughout all these units, and some of these only on computer summary tapes. Nonetheless, it is apparent that numerous geographical units are provided by the Census Bureau. A recent Bureau of the Census publication contains a synthesis of the ways political and administrative subdivisions become mixed with Census statistical units; these ideas of connectivity are shown here as Tables 4-3 to 4-5.[8]

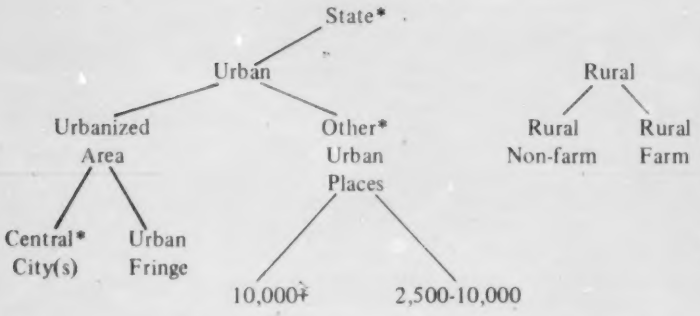
[8] U.S. Bureau of the Census, Data Access and Use Laboratory: "Using Census Data: Concepts, Publications, Computer Tapes, Other Products." An Instructor's Reference Manual, by Cynthia M. Taeuber (Washington, D.C., 1974), p. 11.

TABLE 4-3
INTERCONNECTIVITY OF POLITICAL AND
CENSUS STATISTICAL DIVISIONS – 1



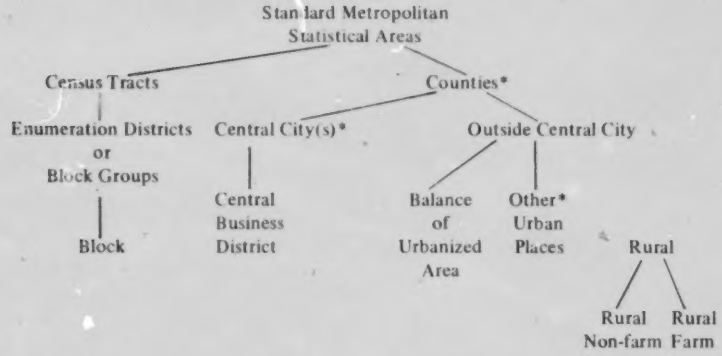
*Indicates administrative or political units for which there are compatible census reporting units.

TABLE 4-4
INTERCONNECTIVITY OF POLITICAL AND
CENSUS STATISTICAL DIVISIONS – 2



*Indicates administrative or political units for which there are compatible census reporting units.

TABLE 4-5
INTERCONNECTIVITY OF POLITICAL AND CENSUS STATISTICAL DIVISIONS – 3



*Indicates administrative or political units for which there are compatible census reporting units.

Both the researcher and classroom teacher, therefore, have a number of areal units, at various scales, with which to work. Geographers have tended toward using increasingly smaller units. It is probably unfortunate that more social and economic data are not available for block units. Total population, and, of course, housing information, are available; however, for the urban geographer interested in social geography these are frequently not adequate. For the teacher of this subfield of geography, census tracts remain the smallest unit for which a number of data are available. The best use of these is to illustrate geographical variables, hypotheses, and mapping techniques. Many of the activities presented elsewhere in this volume, in fact, have incorporated census tract-level data.

GRAPHIC SUMMARY OF THE 1970 POPULATION CENSUS

Several Supplementary Reports have been issued as part of the *1970 Census of Population.* One that should prove interesting, informative, and useful for teachers is the *Graphic Summary of the 1970 Population Census.* Although it is composed of material that previously was bound in volumes of the Census, its booklet format makes it easy to use. Its cost is very reasonable and as such could be placed on a book list for college students. Its textual material makes it compatible with most college geography courses, and it can also be used in classes from the elementary to secondary levels.

Material in the volume has been excerpted from *Number of Inhabitants* and the *General Social and Economic Characteristics.* It contains a total of seventy-eight maps and charts, all in color. A census regions map is included, as are these maps of urban interest: SMSAs, urbanized areas, population distribution (urban and rural), and percent of population urban by counties. Maps of the United States by counties include congressional districts, population density, percent change in total population 1960 to 1970, population trends by counties 1940 to 1970, and year of maximum population. A number of maps that portray data at the state level encompass changes in congressional representation 1960 to 1970, percent change in total population 1950 to 1960, and for 1960 to 1970, percent change in urban population 1960 to 1970, and in the rural population for the same years. A map showing percent of population urban 1970 is also part of this list. Many of the maps at the county level are those published in the GE-50 Series.

Charts make up much of the booklet. Employment totals in selected industries, percent women in the labor force, percent unemployed, and major occupations of employed persons (by race and sex) 1970 and 1960 are a few examples.

The *Graphic Summary* is a convenient source for geographers of facts that relate specifically to population distribution, and for certain facts that relate to demographic characteristics. It is the kind of volume that contains a great amount of descriptive data, and as such can be used along with other volumes of data, notably the *County and City Data Book.* For those interested, there is likewise a *Graphic Summary of the 1969 Census of Agriculture.*

RELATED PUBLICATIONS

Two recent publications will have utility in the classroom, especially for the teacher. One is *Social Indicators, 1973,* and the other the *We the Americans* Series.[9] *Social Indicators, 1973* is a publication produced by the Executive Office of the President, Office of Budget and Management, that brings together various socio-economic data as collected mostly by census programs, and presents only national totals (a few regional components are illustrated). The volume presents health, public safety, education, employment, income, housing, leisure and recreation, and popula-

[9] Executive Office of the President, Office of Management and Budget, *Social Indicators, 1973* (Washington, D.C.: Government Printing Office, 1973); and U.S. Bureau of the Census, *We the Americans* Series (various titles) (Washington, D.C.: Government Printing Office, 1972-).

tion time-series from generally fifty years ago to the present time (1970). Numerous color charts accompany the textual materials. *Social Indicators, 1973* therefore becomes a resource volume that can be used by the teacher in developing ideas, presentations, and national comparisons to augment local geography activities.

Another publication that has begun since the 1970 Census is the *We the Americans* series. This series was initiated for grade school students, and each one is written in an easily comprehended style, accompanied by numerous tables, charts, and photographs. The series has a further advantage in that each is reasonably priced, some at forty, and others at forty-five cents. Multiple-copy discounts of 25 percent are available. They range in length from about sixteen to twenty pages. Therefore, the teacher could plan to order classroom sets.

Table 4-6 lists those in the series presently available. *Who We Are* (Number 1 in the series) deals mostly with United States population. Population growth from 1790-1970, suburbanization, state population totals and densities, apportioning seats in Congress, city populations, race and ethnic backgrounds, demographic characteristics, and Americans on the move, are among the topics discussed in *Who We Are*. The charts and tables are designed for quick visual and intellectual assessment and are integral to the presentation. This particular publication can be used in the classroom both as a resource and as a document to present geographical ideas and concepts. The teacher would be wise to inspect these most interesting and useful booklets.

TABLE 4-6
PUBLICATIONS IN THE WE THE AMERICANS SERIES

1. *Who We Are* shows population distribution by location, race, and age.
2. *We, the Black Americans* measures black status in education, employment, and income.
3. *Our Homes* describes the rapid increase of American housing.
4. *We, the American Women* gives facts about females from infants to centenarians.
5. *Our Incomes* tells about American Family incomes.
6. *Nosotros*, meaning "We," is about Americans of Mexican, Puerto Rican, and other Spanish-speaking heritage.
7. *Our Cities and Suburbs* discusses America's explosive suburban growth.
8. *Our Education* looks at American schooling – kindergarten through college.

9. *The Work We Do* reports on the diversity of our jobs.
10. *We, the American Elderly* talks about the growing number of Americans over age 65.
11. *We, the Young Marrieds* discusses the declining marriage rate and attitudes toward marriage.
12. *We, the First Americans* reports on the outstanding characteristics of the American Indian both of his past and present.
13. *We, the Asian Americans* reports on the successes of the Chinese, Japanese, and Filipino Americans.
14. *We, the Youth of America* gives many facts about this influential segment of the population.
15. *We, the American Foreign Born* tells how well nationals of other countries have blended into the American mainstream.

Source: U.S. Bureau of the Census, Social and Economic Statistics Administration (Washington, D.C., 1974).

SUMMARY

It is difficult to attempt a complete summary of the Census of Population in a few pages. Only the highlights have been treated, giving some idea of the kinds of items available, what scales are presented, and how several geographers have used this material recently. Two useful publications have been treated at the end, and teachers are encouraged to peruse these at their leisure. Notwithstanding the complexity and cumbersome nature of the Census of Population, it is still by far the most useful data source for the teacher and researcher.

5

Using Population Statistics as Indicators: A Study of Three Communities

MARILEE JEAN BRADBURY
Jefferson County Public Schools
Colorado

The three communities selected for this study represent three different population groups located within the same county and part of a suburban complex (Fig. 5-1). The differences in population characteristics are reflected by the diversity of interests and support expressed by the communities as local and county issues arise. Community population statistics are used by students to generate "indicators" or ideas concerning the needs and interests of each community. The problem for students in this activity is to identify population characteristics using statistical data, and then with this information analyze the position their community would take concerning various county issues.

These communities were selected because the students who used this material actually live in this county. In studying local issues, students could more readily empathize with causes for conflict over such issues as land use or school bond proposals, and more readily understand the meaning of resolution, and at the same time keep in mind the needs of all.

OBJECTIVES

At the conclusion of this activity students will be able to:

1. Extrapolate information from data to form community characteristics
2. Analyze these characteristics as indicators of community needs and interests
3. Apply their own experiences and understandings, as well as the data, to the community situation in order to resolve problems
4. Interact with others through class discussion, sharing conflict and compromise over various issues and problems

5. Evaluate the process of conflict resolution
6. Determine the future of a community by using experience and applying data

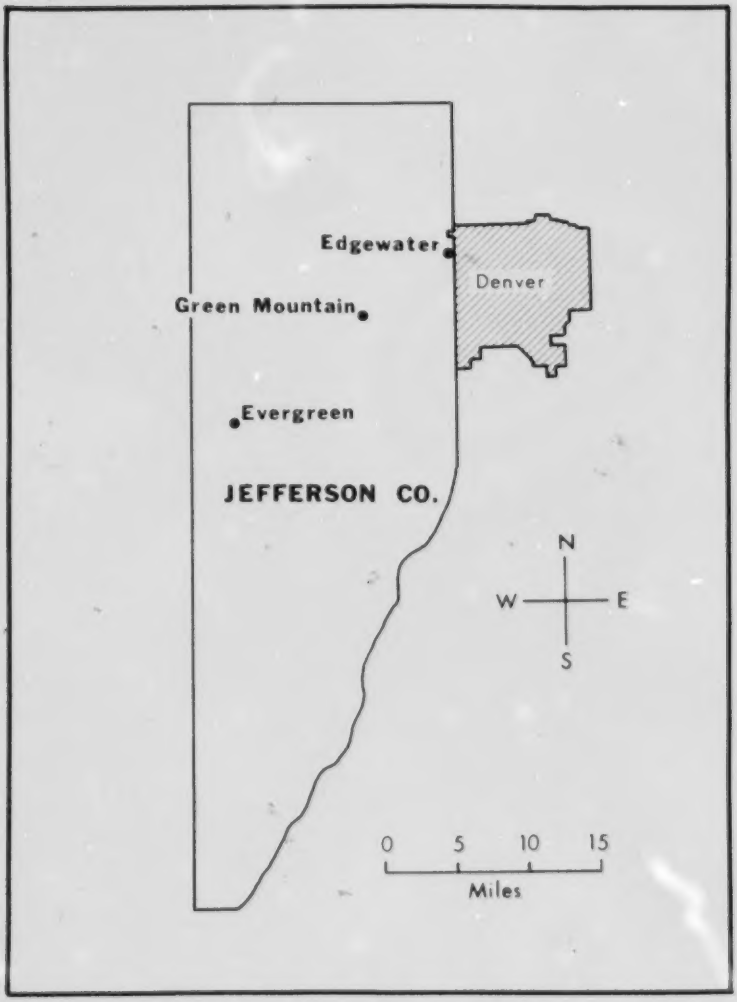


Figure 5-1. The location of three communities in Jefferson County, Colorado.

TEACHING STRATEGY

The population statistics provided in this activity represent only a fraction of the statistics gathered by the Census Bureau for the communities in 1970. The intent here is to introduce students to some of the data and then to encourage them to make inferences from this information. The following steps are suggested in teaching this activity. Evaluation possibilities are included in each step.

STEP 1. ORGANIZING THE CLASS AND DISTRIBUTING STUDENT MATERIALS

Divide the class into three groups, each group representing one of the three communities. Students should receive and review the student materials for the particular communities they represent. Students *must* be able to read the graphs. The following questions are only suggestions which direct students to a particular graph and ask them to identify specific information; these are to ensure they understand how to use the graphs. Although each group will have different answers, they can be used in classroom discussion as an introductory comparison of the three areas. Questions regarding the *Population Pyramid* (Figs. 5-2, 5-6, and 5-10):

Which age group has the largest percentage of the total population?

Are there more males or females in the population?

Approximately what percent are 55 or older?

Why do you think there are more people between 25 and 34 than between 20 and 24 in your community?

Questions regarding the graph *Income in 1969 of All Families and Related Individuals* (Figs. 5-3, 5-7, and 5-11):

What percentage of the people earn approximately $8,000 a year?

How much yearly income is earned by at least half of the workers?

Questions regarding the *Year the Residential Structure Was Built* (Figs. 5-4, 5-8, and 5-12):

What percentage of the homes were built before 1940?

During what year was the greatest amount of building?

During what year and at what percent was the least amount of growth?

Questions regarding the *Year the Current Family Moved into the Residential Structure* (Figs. 5-5, 5-9, and 5-13):

During what year did most of the families move into their homes?

What percentage of the people have lived in their homes since 1950?

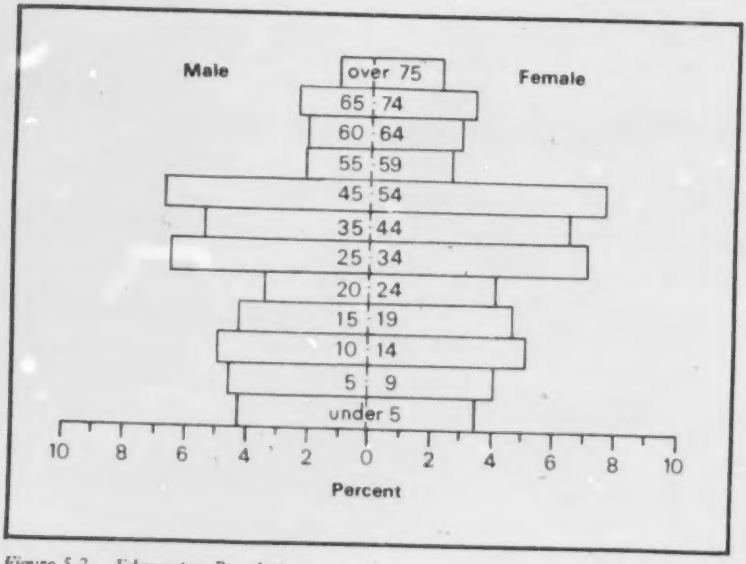


Figure 5-2. Edgewater: Population pyramid.

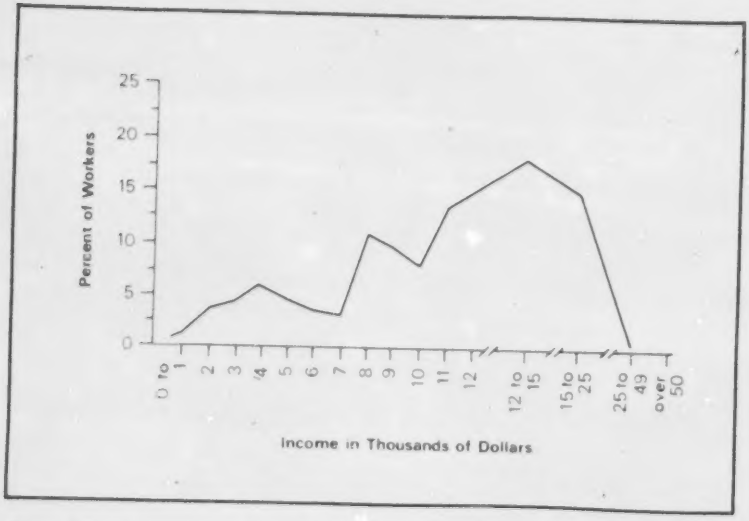


Figure 5-3. Edgewater: Income in 1969 of all families and related individuals.

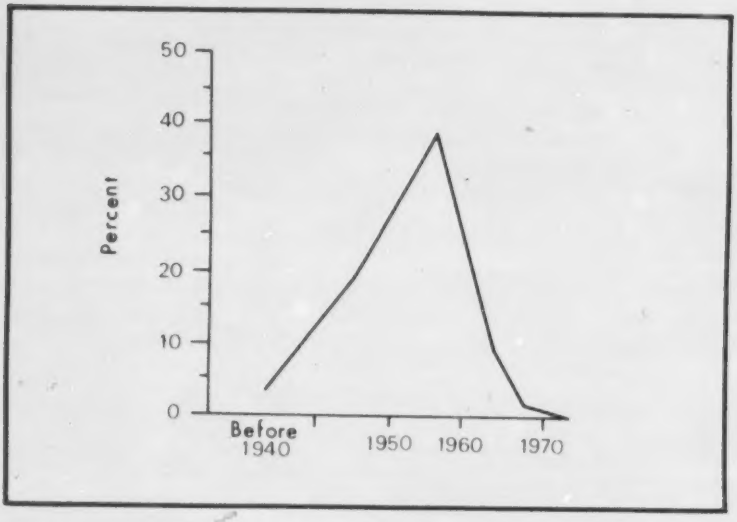


Figure 5-4. Edgewater: Year the residential structure was built.

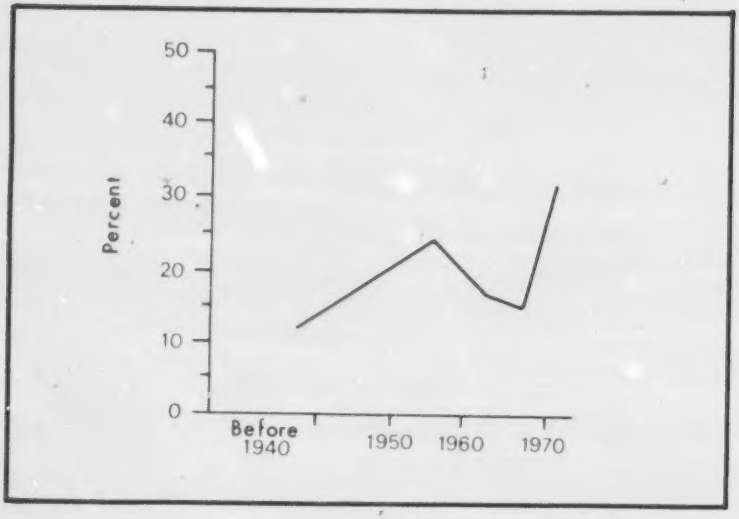


Figure 5-5. Edgewater: Year the current family moved into the residential structure.

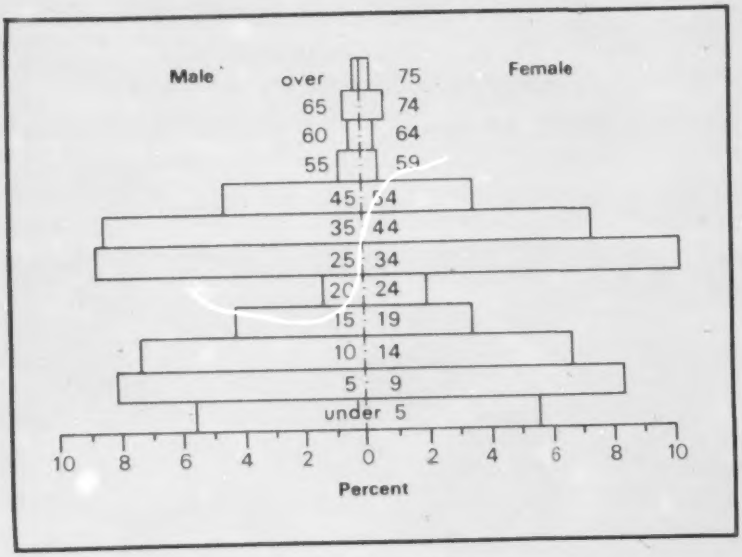


Figure 5-6. Green Mountain: Population pyramid.

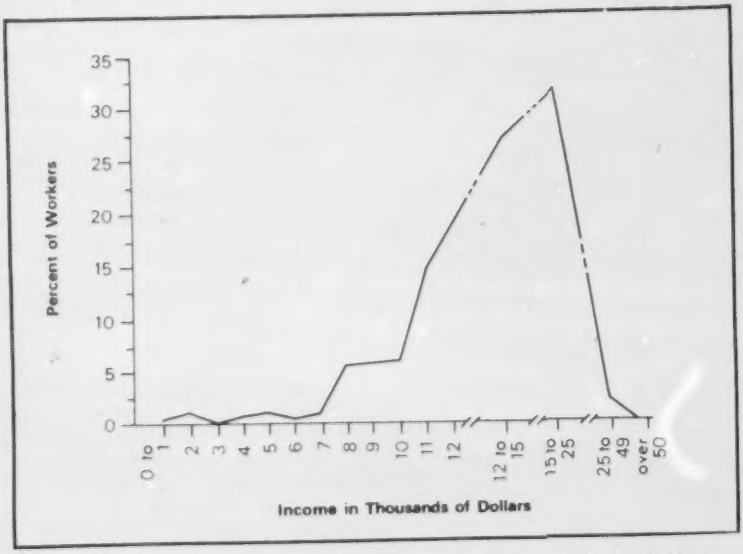


Figure 5-7. Green Mountain: Income in 1969 of all families and related individuals.

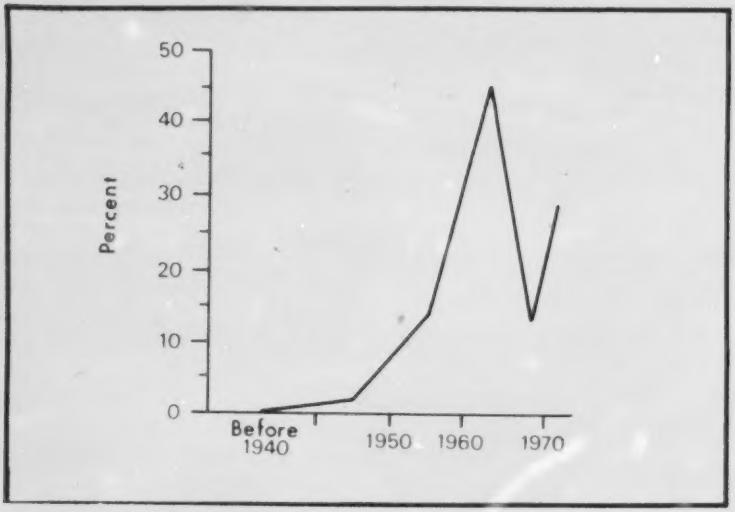


Figure 5-8. Green Mountain: Year the residential structure was built.

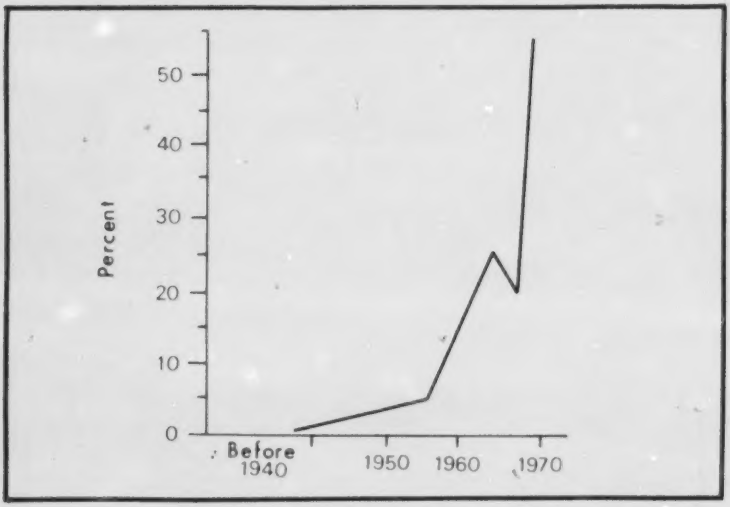


Figure 5-9. Green Mountain: Year the current family moved into the residential structure.

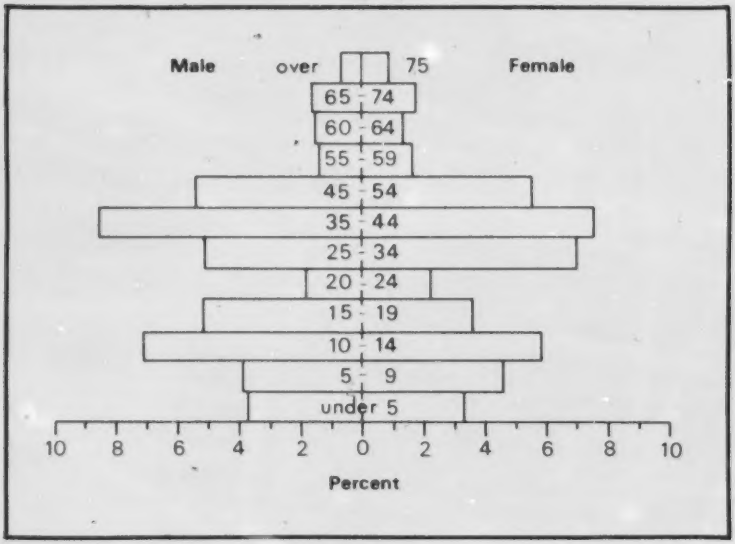


Figure 5-10. Evergreen: Population pyramid.

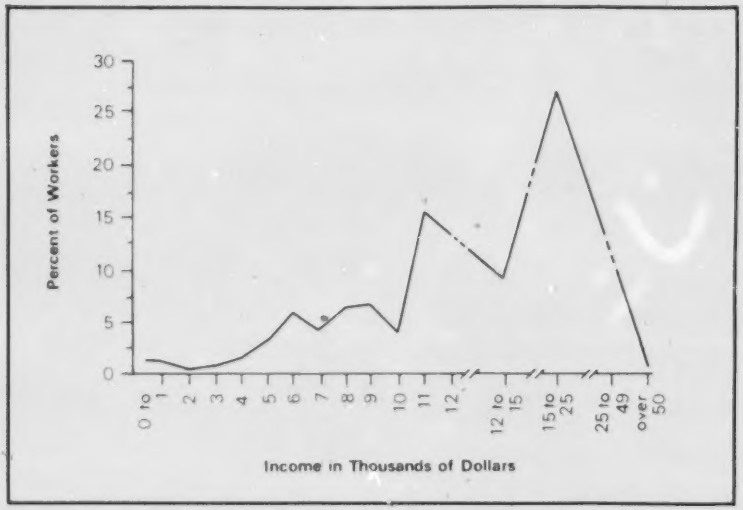


Figure 5-11. Evergreen: Income in 1969 of all families and related individuals.

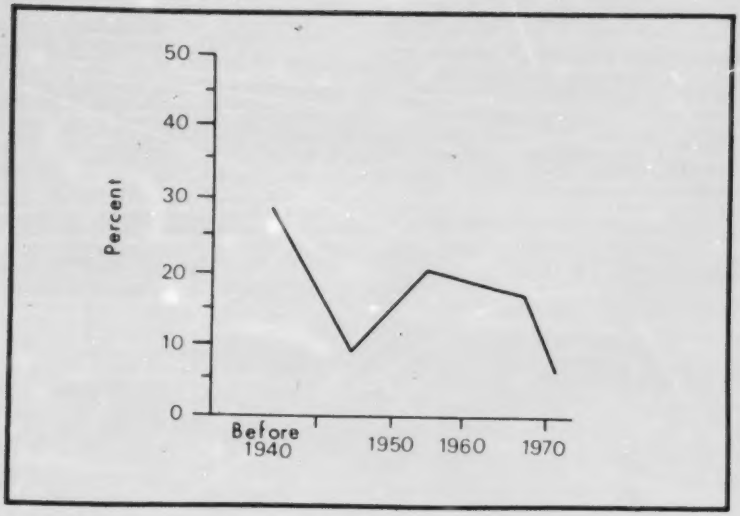


Figure 5-12. Evergreen: Year the residential structure was built.

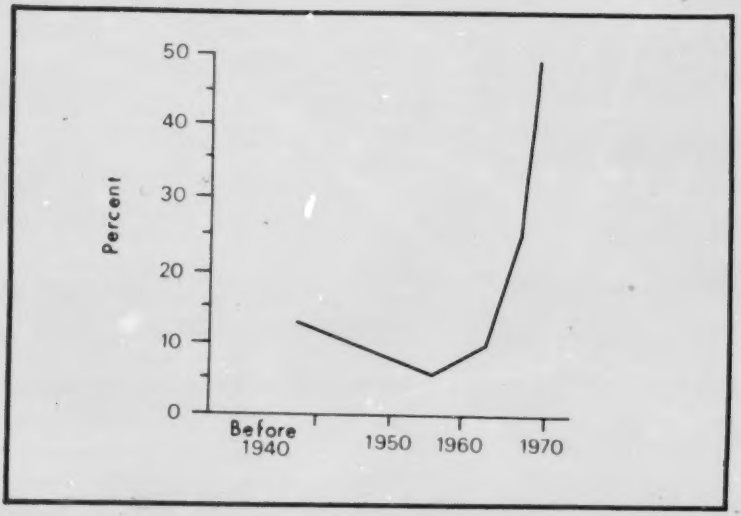


Figure 5-13. Evergreen: Year the current family moved into the residential structure.

STEP 2. ANALYSIS AND COMPARISON OF COMMUNITY DATA

In each community group students analyze data, listing as many observations and generalizations as possible by identifying population characteristics of their area. Some suggestions include: What generalizations or overall statements can you make concerning the population pyramid for your community? What general or overall statements can you make concerning the distribution of income? Using the population pyramid and the distribution of income graph, what can you say about those living in your community?

Students should be encouraged to analyze, compare, and contrast the graphs in this manner, not only analyzing each graph by itself, but with reference to the others.

STEP 3. IDENTIFYING COMMUNITY PRIORITIES FROM POPULATION CHARACTERISTICS

Each student is given a copy of *Current Issues* (Table 5-1). While using the previously identified population characteristics as a guide, students should rank the issues according to the priorities they feel reflect the needs of their community. They should make inferences about the attitudes and values held by the community. The groups should discuss each issue and come to concensus on

TABLE 5-1
CURRENT ISSUES

Rank the following issues according to your community needs and interests. A number 1 indicates it is most important and 13 least important.

_____ Recreational facilities, especially for children
_____ Improved public transportation system
_____ New county public schools
_____ Home improvement programs sponsored by the county.
_____ Improved fire protection
_____ New county swimming pool
_____ Make your own suggestion if not listed here. Write it out on the bottom of this page
_____ Stronger zoning laws to halt business development
_____ A new county library
_____ Greater welfare benefits
_____ Improved county medical services
_____ Stronger zoning laws to halt residential expansion
_____ Build low income housing, especially for the aged

their ranking, and should be prepared to debate them and justify their conclusions with regard to the community they represent. Two persons from each group are elected as representatives to the "County Commissioners Meeting."

STEP 4. THE COUNTY COMMISSIONERS MEETING

Students will simulate a county meeting, and the two representatives from each group will act as spokesmen for their community during the meeting. The purpose of this meeting is to share with others the priority considerations of each community and come to a concensus concerning the top four issues to be dealt with by the county during the coming year. County representatives have equal voting power. A chairperson could be selected or elected by the county representatives. All students should have time to question, debate, or clarify a statement or issue.

STEP 5. CONCLUDING ACTIVITY

Students should complete the following as a conclusion to this activity:

1. Discuss as a class the conduct of the county meeting giving special emphasis to the process of reaching an agreement, leadership roles, alienation of groups, and coalitions.
2. Using the experience and materials learned from the activity, students should answer these two questions in as much detail as possible: How do you think your community will benefit by the issues passed by the county representatives? How do you think the population characteristics of the community will change during the next fifteen years?

SUMMARY

This activity is intended as a model demonstrating one use of population census materials in the classroom. The census data is readily available and can be easily implemented into a program emphasizing the student's local area. Having census materials in the classroom facilitates student inquiry to find support for hypotheses.

EDGEWATER: STUDENT MATERIALS

Edgewater is located on the east side of Jefferson County, bordering the city and county of Denver. The boundary line dividing the two counties is a heavily traveled street, lined with small

businesses such as filling stations, drive-in restaurants, an X-rated movie house, and a lawn mower repair shop. A number of these businesses are located in old homes on the busy street, and since the area is re-zoned for business, many of the homes are being torn down and new stores built. The town of Edgewater includes an area of about one square mile. Edgewater has a mayor, a fire and police department, and a town meeting hall.

Total population: 3992
Median income: $9,685
Percentage of population high school graduates: 40%
Percentage of population college graduates: 5%

GREEN MOUNTAIN: STUDENT MATERIALS

Green Mountain is located in the central area of Jefferson County, and was named after the mountain that is located directly west of it. Some homes are built on the lower slopes of the mountain, but because of soft moving soil, further home building up the mountain has been prohibited. Green Mountain is an unincorporated place. It does not have an elected mayor or councilmen, and the people rely on the county for decisions. Such services as fire and police protection are directly determined by the county.

Total population: 6096
Median income: $13,233
Percentage of population high school graduates: 39%
Percentage of population college graduates: 26%

EVERGREEN: STUDENT MATERIALS

The town of Evergreen, named after the evergreen forest that is typical of the mountains, is located in the western area of Jefferson County. The small business section of Evergreen is extremely active in the summer with many visiting tourists. The Evergreen Town Council makes decisions concerning fire prevention since many tourists and campers increase the probablity of forest fires. Being isolated from other major communities and services of the county, the people have become quite strong in voicing their needs for such services as improved sanitation disposal.

Total population: 2796
Median income: $11,833
Percentage of population high school graduates: 25%
Percentage of population college graduates: 87%

SOURCES FOR STUDENT MATERIALS

U.S. Bureau of the Census. *1970 Census of Population: General Social and Economic Characteristics*, Colorado. (Washington, D.C.: Government Printing Office)

U.S. Bureau of the Census. *1970 Census of Population: General Population Characteristics*, Colorado. (Washington, D.C.: Government Printing Office)

U.S. Bureau of the Census. *1970 Census of Population: Number of Inhabitants, Colorado.* (Washington, D.C.: Government Printing Office)

6

The Clientele of the District

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Pueblo, Colorado

This activity originated when one of my seventh grade students wanted to know what the students were "like" at one of the other schools where I had taught. We thus called this activity "The Clientele of the District." A similar activity can be designed for any "district."

OBJECTIVE

The purpose of this activity is to help junior high school students learn to seek out and interpret demographic data, specifically population characteristics. This is done by the students to learn more about their rural community and the people who live in it. Once they have gathered sufficient information, they should compare their findings with other cities of the same size. This is the real significance of their research.

MATERIALS NEEDED

The following material is needed by the student to complete the activity:

Map of Community
Census Population Characteristics
County Areas: Square Miles
Population Projections of Colorado Counties

TO THE STUDENT

As you prepare to learn more about your community through demographic data, it seems appropriate to suggest that as you search to find the answers to most of the questions asked, it is not so important how the question is worded, but what function it

performs. Finding the answers to these questions will help you understand that specific facts are more valuable than general impressions.

INFORMATION I NEED TO KNOW ABOUT THE RURAL COMMUNITY

1. With a colored pencil outline on the map (Fig. 6-1) the subdivision in which you live.

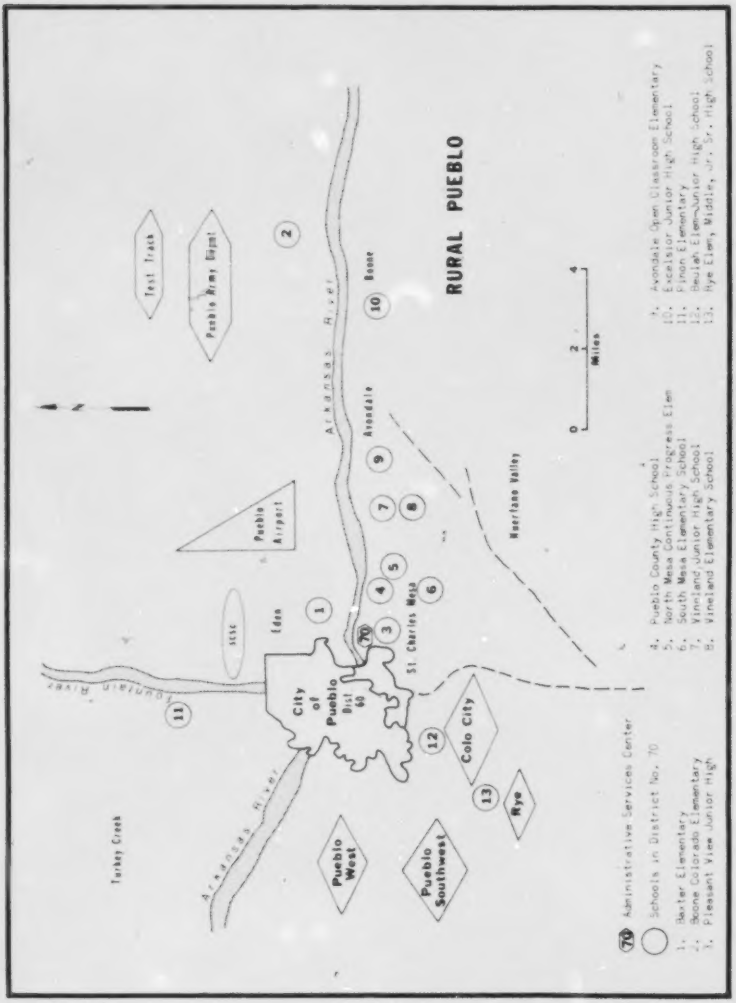

Figure 6-1.

2. Using the data from the Census Population Characteristics (Table 6-1), record on the map the 1970 population of each subdivision. Record the percent of increase or decrease.

TABLE 6-1
CENSUS POPULATION CHARACTERISTICS
PUEBLO SMSA
(Pueblo County)
POPULATION CHANGE, 1960-1970

County Subdivisions	*1970*	*1960*	*Percent Change*
Pueblo County	118,238	118,707	-0.4
Avondale division	2,688	3,144	-14.5
Boone division	1,115	1,335	-16.5
Eden division*	2,745	5,413	-49.3
Huerfano division	624	828	-24.6
Pueblo division	97,601	91,184	-7.0
Pueblo City	97,453	91,181	6.9
Pueblo Southwest division*	5,182	5,991	-13.5
Rye Town	207	179	15.6
St. Charles Mesa division	7,036	7,507	-6.3
Turkey Creek division*	1,247	3,305	-62.3

*Minor adjustments were made in the CCD's within Pueblo County for 1970. Parts of Eden, Pueblo, Pueblo Southwest, and Turkey Creek divisions were annexed by Pueblo City.

Source: Colorado State Planning Office, *Population of Colorado Counties*, 1960-2020; U.S. Bureau of the Census, *1970 Census of Population: Number of Inhabitants, Colorado.*

3. The Pueblo Division extends slightly beyond Pueblo City. For the purpose of this study the City of Pueblo, as shown on the map, will serve as the Pueblo Division.
4. How many subdivisions are there in your county?
5. List the name and size of the three largest subdivisions.
6. Which subdivision had the largest population increase in 1970? What do you think might be a reason for this increase?
7. Give the name of the subdivision that has more females than males living in it (Table 6-2).
8. What subdivision has the largest percentage of population under 18 years of age? Why is it important to know this?
9. How many households are located in Boone?
10. What subdivision ranks third in the number of households?
11. What subdivision has the largest number of persons per household?
12. What subdivision has the least number of persons per household?
13. How many people are there in your county?
14. How many people are in the community you have identified?

TABLE 6-2
GENERAL POPULATION CHARACTERISTICS OF PUEBLO COUNTY SUBDIVISIONS, 1970

	Avondale	*Boone*	*Eden*	*Huerfano*	*Pueblo Div.*	*P.S.W.*	*St. Chas.*	*Turkey Creek*
Total Population	2,688	1,115	2,745	624	97,601	5,182	7,036	1,247
SEX								
Male	1,384	546	1,407	329	47,587	2,658	3,554	641
Female	1,304	569	1,338	295	50,014	2,524	3,482	605
RACE								
White	2,679	1,109	2,707	618	94,857	5,140	6,978	1,236
Negro	2	—	22	2	2,071	26	34	4
Other	7	6	16	4	673	16	24	7
AGE								
Median	23.5	21.5	22.3	28.4	27.6	27.8	22.9	22.8
Percent under 18 yrs.	42.5	44.8	42.2	40.7	35.3	37.0	42.5	43.4
Percent 65 yrs. & over	7.2	7.8	6.1	8.7	10.0	8.4	5.5	3.8
HOUSEHOLDS								
Total Number	705	277	734	180	29,758	1,592	1,787	340
Total Population	2,676	1,095	2,695	624	93,840	5,155	6,980	1,247
Persons per Household	3.80	3.95	3.67	3.47	3.15	3.24	3.91	3.67

SOURCE: Colorado State Planning Office, *Population of Colorado Counties*, 1960-2020; U.S. Bureau of the Census. *1970 Census of Population: Number of Inhabitants, Colorado.*

15. How many people in your community are white?
16. How many people in your community are nonwhite?
17. What percentage of the people living in your community are under 18 years of age?
18. How many people in your county have Spanish Surnames (Table 6-3)?

TABLE 6-3
SELECTED CENSUS POPULATION CHARACTERISTICS
PUEBLO SMSA
(Pueblo County)

Selected Characteristics	*1960*	*1970*	*Percent Change*
Total Population	118,707	118,238	-0.4
White	116,085	115,324	-0.7
Negro	2,247	2,161	-3.8
Negro Percent of Total Population	1.9	1.8	–
Spanish Surname	25,437	32,870[a]	29.2
Spanish Percent of Total Population	21.4	27.8	–
Other Races[b]	375	753	100.8
Other Races Percent of Total Population	0.3	0.7	–
16 through 21	9,107[c]	13,576	49.1
Percent of Total Population	7.7	11.5	–
22 through 44	33,970	31,654	-6.8
Percent of Total Population	28.6	26.8	–
45 and over	33,468	35,314	5.5
Percent of Total Population	28.2	29.9	–
Male	58,749	58,106	-1.1
Female	59,958	60,132	0.3

a Estimate provided by Colorado State Planning Office
b Includes Indian, Japanese, Chinese, Filipino, and all other races.
c Estimated from slightly different 1960 Census age definitions.

Source: Colorado State Planning Office, *Population of Colorado Counties*, 1960-2020; U.S. Bureau of the Census, *1970 Census of Population: Number of Inhabitants, Colorado.*

19. How many people in your county are white?
20. How many people in your county are Negro?
21. How many people in your county are of other races?
22. What is the population density of your county (Table 6-4)? Population density is the number of people per square mile. Divide the total population of your county by the number of square miles it contains.
23. Using the county population projections for Colorado counties (Table 6-5), compare these counties located on the Front Range: Adams, Arapahoe, Boulder, Denver, El Paso, Pueblo, and Jefferson.
    a. Which of the counties might encourage growth? Why?

b. Which of the counties might not encourage growth? Why?
c. In your opinion, where would industry be encouraged to locate? Why?

In a subsequent activity these findings for Pueblo County will be compared with those of El Paso County, Colorado. Reasons for and the significance of similarities and differences will then be discussed.

TABLE 6-4
COUNTY AREAS: SQUARE MILES

County	*Square Miles*	*County*	*Square Miles*	*County*	*Square Miles*
Adams	1237	Fremont	1561	Montrose	2238
Alamosa	719	Garfield	2996	Morgan	1278
Arapahoe	797	Gilpin	148	Otero	1254
Archuleta	1364	Grand	1854	Ouray	540
Baca	2563	Gunnison	3220	Park	2162
Bent	1519	Hinsdale	1054	Phillips	680
Boulder	748	Huerfano	1574	Pitkin	973
Chaffee	1038	Jackson	1622	Prowers	1621
Cheyenne	1772	Jefferson	783	Pueblo	2405
Clear Creek	394	Kiowa	1767	Rio Blanco	3263
Conejos	1268	Kit Carson	2171	Rio Grande	915
Costilla	1213	Lake	379	Routt	2330
Crowley	802	LaPlata	1683	Saguache	3144
Custer	737	Larimer	2611	San Juan	391
Delta	1154	Las Animas	4794	San Miguel	1283
Denver	95	Lincoln	2593	Sedwick	544
Dolores	1026	Logan	1822	Summit	604
Douglas	843	Mesa	3301	Teller	553
Eagle	1681	Mineral	921	Washington	2526
Elbert	1864	Moffat	4743	Weld	4002
El Paso	2157	Montezuma	2094	Yuma	2379
				STATE TOTAL	103,766

Source: U.S. Bureau of the Census, *County and City Data Book, 1972* (A *Statistical Abstract* Supplement), Table 2, p. 66.

TABLE 6-5
POPULATION PROJECTIONS FOR SELECTED COLORADO COUNTIES
1980 – 2020

County	*Present*	*Projected*				
	1970	*1980*	*1990*	*2000*	*2010*	*2020*
Adams	185,789	273,000	315,000	375,000	425,000	480,000
Arapahoe	162,142	225,000	340,000	400,000	450,000	505,000
Boulder	131,889	192,000	240,000	300,000	375,000	455,000
Denver	514,678	568,000	580,000	625,000	663,000	710,000
El Paso	235,972	300,000	350,000	400,000	450,000	500,000
Jefferson	233,031	371,881	415,000	475,000	550,000	650,000
Pueblo	118,238	150,000	200,000	250,000	300,000	350,000
STATE	2,207,259	2,795,043	3,287,300	3,814,525	4,342,525	4,923,000

Sources: Colorado State Planning Office, *Population of Colorado Counties*, 1960-2020; U.S. Bureau of the Census, *1970 Census of Population: Number of Inhabitants, Colorado*.

7

Suburban Zoning Conflict: An Urban Problems Game

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Land uses around any large metropolitan area are not static, but change daily. Most often these changes reflect immediate needs of the incoming people to these areas. Generally, we can understand the pattern of land uses by an overall examination of the distribution of population, how it has changed in the past, and where it is likely to change in the future. More subtly, however, there are many political and private decisions that are made that can explain at least portions of the land use map. The present game treats a zoning situation and examines a particular problem of whether or not to allow a site to be zoned commercial for a future regional shopping center.

It has been observed in the operation of this game several times that its chief merit lies in being catalyst for further discussion, that it engenders in students a desire to search out real facts, and serves as a springboard for discussion involving urban geography theory and hypotheses. Although it has been used mostly in college freshman and sophomore classes, it can be adapted easily for the secondary level, and perhaps even junior high level.

TEACHING GOALS

The objectives of this game include the following:

1. To introduce students to the dynamic aspects of suburban land-use zoning
2. To suggest to students that zoning decisions are not always rational, but frequently include political decision-making that serves special interest groups only

The author wishes to thank Mrs. Susan Friddel, a geography major who has participated in the game, for her suggestions for changes in the game's strategy. She is a most able student and many of her thoughts have been incorporated in this version of the game.

3. To provide a vehicle through which students can question their own land-use map, and the decisions that went into its components
4. To make them better aware of how the administrative-political structure affects their local geography
5. To introduce students to three sources of information, the U.S. censuses of population, manufacturing, and business.

TEACHING MATERIALS

The materials necessary for this game are:

1. "Center City" description
2. "The County" description
3. "District 7" description
4. Three maps: Figures 7-1, 7-2, and 7-3
   (Note: Items one through four are distributed to every member of the class)
5. "The Councilman" role
6. "The Windgate Attorney" role (Windgate Housing Development)
7. "The Planner" role
8. "The Ms. Hinds" role
   (Note: Items five through eight are distributed to those students who play these respective roles in the various teams.)

TEACHING STRATEGY

The game is played by dividing the class into several teams with four members to a team. The team members are: the Councilman, the County Planner, the Windgate Attorney, and Ms. Hinds (another Councilperson). The situation is a County Council hearing, the purpose of which is to listen to arguments by proponents for the regional shopping center, and opponents to the plan. The teacher should distribute the descriptions and maps to every student in the class so that they will gain a better understanding of the problem. Each member of the team should also be given the materials that outline his or her role in the game and lists the various arguments that person is to use in the game. These should *not* be shared with the other team members, as they represent in some cases *confidential* material that a team member would rather not disclose until asked to do so when the student presents his or her arguments.

The teacher should introduce the game, distribute materials, and explain role playing in one session. The students should have

the opportunity to examine their roles and arguments well in advance of the actual hearing. It has also been found wise to form a session where all the members of one role meet together to discuss their respective strategies. This actually serves to allow students to develop their own materials for later arguments in the hearing. In some cases the role members may want more time to research their positions.

The history leading to the County Council meeting is as follows. Annually the County Planner (and his staff) present to the County Council a zoning map for their adoption and later implementation. Usually, public hearings are held to listen to arguments from various factions of the population. In the present case, the zoning map was presented to the Council and was approved, with one exception: Ms. Hinds (Councilwoman from District 7) proposed a change and suggested that the 80-acre site at the southwest corner of the I-91 and Perrytown Road be zoned commercial for a regional shopping center. This proposal has lead, then, to the public hearing that makes up this game. This hearing is composed of the four team members mentioned above.

It is clearly recognized at the outset that the County Planner is *opposed* to the new proposal, as is the Windgate Attorney. Ms. Hinds is in *favor* of the proposal. The Councilman (who actually represents all other Councilpersons) chairs the public hearing, and based on the arguments presented him, shall make a decision to either adopt or not adopt the proposal. At the end of the game, each Councilman will give a verbal report to the entire class giving reasons for his final decision.

The Councilman, in chairing the hearing, must call for the arguments in the following order:

1. The County Planner's arguments
2. Ms. Hinds' arguments.
   (Note: the Councilman *must* call a 10-15 minute recess here.)
3. After reconvening the meeting, the Windgate Attorney's arguments

TEACHING MATERIALS

CENTER CITY

Center City is a large city in the northeastern corner of the state (Fig. 7-1). Its population is approximately 900,000, although the entire SMSA (composed of six counties: Fayette, Lawrence, Imboden, Layne, Columbus, and Martin) has a population reaching 2 million. The principal economic foundation of the city rests on heavy manufacture (steel, aluminum, petro-chemical, heavy

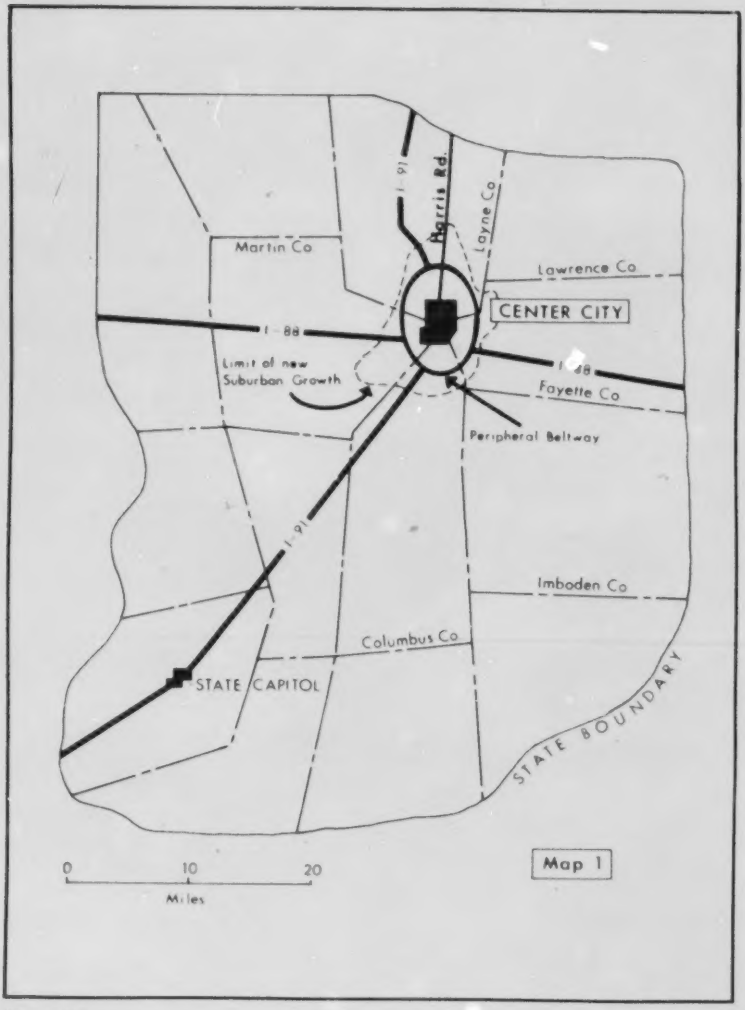

Figure 7-1.

machinery, and auto assembly). There is also considerable light industry in the city, including small metal fabrication, small machine parts, various assembly plants, electronic firms, and canning plants. The city is a "forward looking" city, and has attempted to provide modern services and cultural facilities for the entire metropolitan area. Road building in the state has been

progressive and the city is serviced by two major interstates from outside the state (88 and 91), interlinked with a modern four-lane peripheral beltway that forms a circumferential route around the city.

Population growth around the city has been rapid in the last decade, but it has been geographically uneven. Principal population thrusts are noticeably to the north and the southwest. The population growth in the suburbs has been in response to several factors: (1) increasing amenities in these suburban areas, (2) less congestion, (3) adequate housing supply, (4) jobs, (5) schools, and (6) desire to get out of the "central city." These are typical factors in suburban growth. However, as in the case of most of these new suburbs, there are attendant problems. These include: (1) taxes necessary to support schools and county services (utility, police, and fire) have been increasing rapidly, (2) increasing demand on land utilization (land development for houses, services, schools), (3) an increase in crime, (4) more industry coming in (they too like the suburbs – causing conditions similar to inner-city areas), (5) haphazard planning – not long range enough, and (6) as the result of some of the above, a decreasing feeling of being in the country.

THE COUNTY

Layne County is immediately north of Center City (Fig. 7-2). The approximate limits of suburban growth extend well into the county. Older towns, once at intersections of county roads, and never incorporated, are Townson (the county seat), Perrytown, and Baytown. Of lesser importance (not immediately affected by suburban development) are Tawnytown, Haggers, and Spicerville to the north. These latter towns are more rural in character and are found within areas of the county that are still principally agricultural.

The county is divided into nine administrative units. The residents of the county elect a County Executive, and he presides over the County Council. The Council is formed by representatives elected from each of the administrative units. Unlike many political units, however, the entire county elects each member of the County Council. That is, a representative from District 5, for example, can be elected to the Council although he may not have carried his own district in an election. The residents of the county recognize that this is perhaps not politically efficient, nor necessarily representative, but to date have done nothing to change the election process.

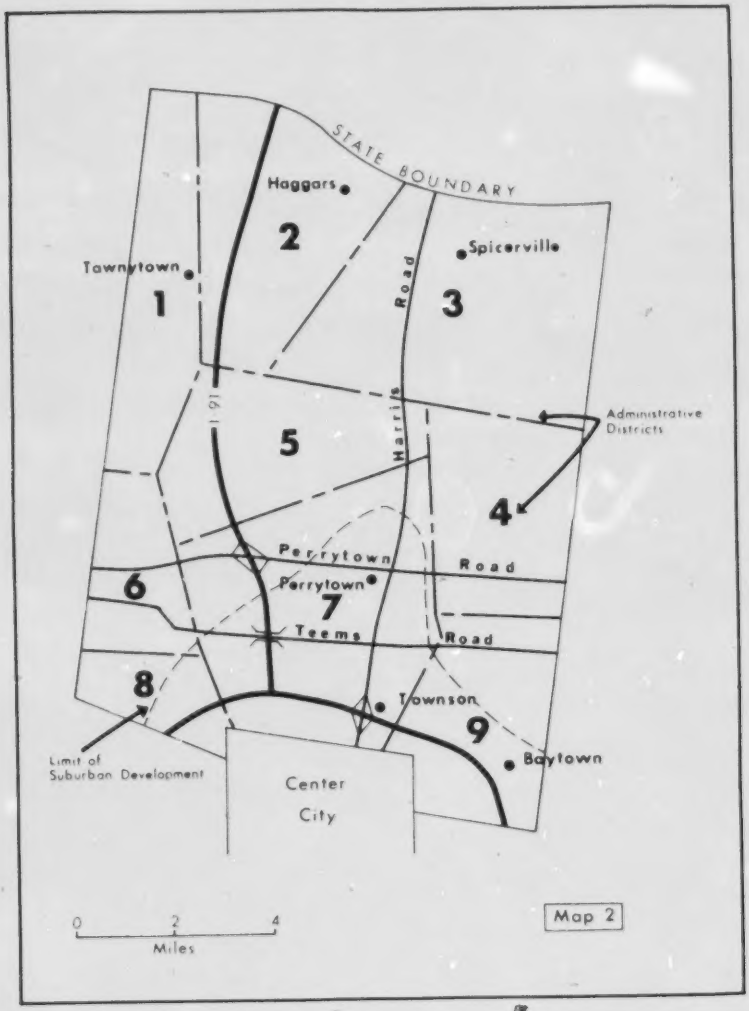

Figure 7-2.

DISTRICT 7

The communities around both Perrytown and Townson are a mixture of both "old" and "new" (Fig. 7-3). The communities in both areas reflect the nature of cross-road towns developed in an era before recent suburbanization. As a result, one will find many

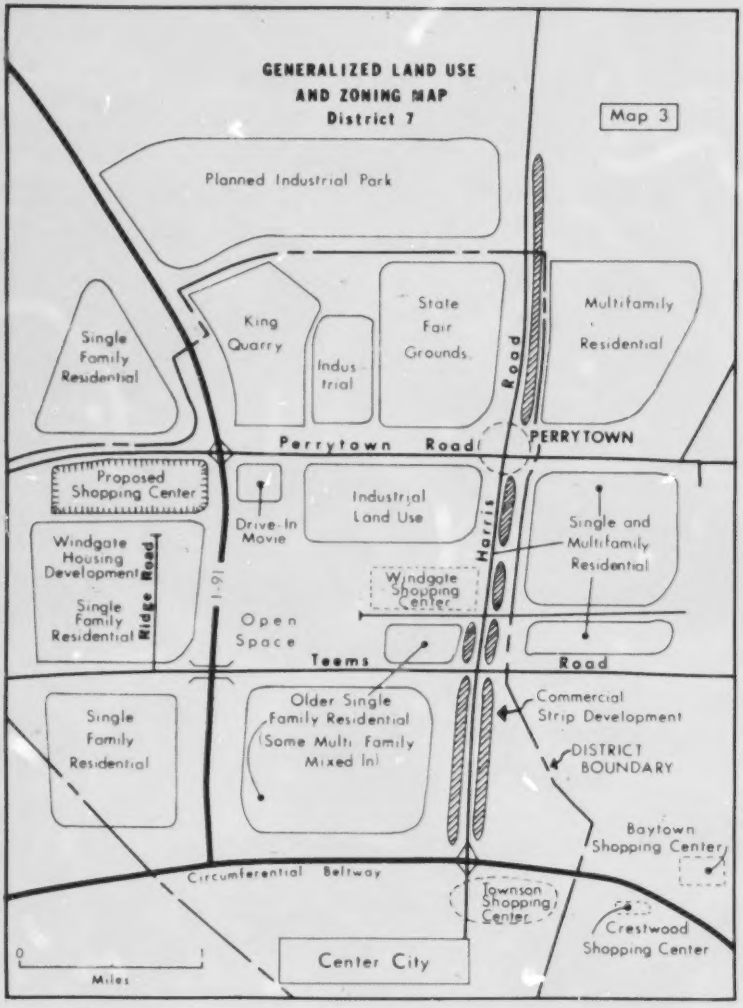

Figure 7-3.

gas stations, small retail operations, and older industrial areas (originally not a nuisance to inhabitants in the area) – such as the large King Quarry (principally extracting dolomites for road-bed gravels). The State Fair Grounds were formerly "out in the country" significantly away from suburban development. Harris Road became heavily commercial subsequent to the new growth

and before the construction of I-91. Business, therefore, became oriented to vehicular traffic. As a result, Harris Road is now crowded on both sides with eating places, gas stations, repair shops, a drug store, a small convenience grocery, and other retail and service establishments oriented to vehicular traffic. With recent suburbanization, this part of the county has become "filled-in" with residential housing communities. To the west of I-91 there are several of these new housing communities, all single family, in the range of $40,–60,000 in value. To the east of this interstate and west of Harris Road, are found most of the industrial and retail functions in the area, with the exception of some older single-family and apartment units just south of Teens Road. Most of the multi-family (apartment) units are found east of Harris Road, although there are also some single family homes. Fundamentally, then, the new growth in this district has taken place west of I-91, and east of Harris Road. *It is important to note this.* The understanding of most residents in the housing developments west of I-91 is that no functions other than residential would ever be zoned in the space west of the interstate. (Obviously, the proposed shopping center just north of the Windgate Housing Development is in violation to this understood zoning scheme.)

The Windgate Shopping Center is relatively new (within the past two years), and was built in response to the growth in population. This shopping center contains a branch of one of the leading department stores of Center City; it also contains a large food supermarket, and a variety of other retail establishments. Roughly three thousand cars enter and leave the shopping center daily. The Crestwood Shopping Center to the southeast is larger than Windgate: it contains a retail establishment (Montgomery Wards), two large food supermarkets, a variety of other retail stores, a large liquor store, and others. Close by is the Baytown Shopping Center, smaller than the other two, but still containing a large discount store chain, a food supermarket, and a few other small retail outlets. The Townson Shopping Center is an unplanned one; it represents a retail clustering of stores around the major intersection of Townson, although it does contain a large branch store of one major department store of Center City. Shopping in this latter shopping center is difficult, as there is considerable traffic congestion and parking problems.

THE COUNCILMAN

Your role is that of a County Councilman (actually, you represent the other seven members of the Council, Ms. Hinds

excluded). Your primary task is to listen to the arguments of the various factors – the County Planners, the attorney of Windgate, and that of your fellow Councilwoman, Ms. Hinds. Your decision will bind the County Executive to act by authorizing final implementation of the plan you adopt.

You will hear various arguments, and you realize that whatever plan you adopt, there will be political ramifications for your future. You sincerely have the best interests of all the county in mind, both your own district and all others.

If you *adopt* the change in the zoning map, you realize that:

1. You will be recognizing that the professional planners who work for the county – and who are best qualified to determine the physical aspects of the problem – are not carrying out their professional activities accordingly.
2. You are advocating haphazard planning, and that you do not recognize the long-range General Plan as feasible or a worthwhile goal.
3. You are willing to spend approximately $250,000 for immediate changes and alteration in the road system feeding into the proposed shopping center site (which will probably lead next year to a tax increase.
4. You do realize that a portion of the revenue earned from the shopping center will be returned to your county; that a number of jobs (approximately 500) will be created; that it will attract business from outside your county; and that this shopping center may well attract other people into other parts of the county, leading to future growth.
5. You will certainly lose votes in the next election of those residents in the Windgate Housing Development and those that are sympathetic to their objections.
6. You do *not* feel the neighborhood is a place where children should be able to play safely.
7. You will be cast as a politician not responsive to public wishes.
8. You recognize that there are perhaps injustices, but that some of the people have to be inconvenienced for the sake of the future growth and image of the entire county.
9. You recognize there is a need for more retail land use space in the county.

If you *do not adopt* the change in the zoning map, you realize that:

1. You will be endorsing the professional planners and are supportive of their plan – and you also recognize that the long-range General Plan is worthwhile and you are willing to fight to implement it exactly.

2. You are willing to fight for the "quality" of the county; that is, you support the idea that major land-use functions should not be mixed.
3. You can save money for the taxpayers who are already overburdened with taxes.
4. You can be accused of not looking out for the future growth of the county; that you are not particularly interested in creating more jobs; and that you may lose votes in the next election of those who support the zoning map change.
5. You will be accepting the will of only a few in the county, at perhaps the expense of the whole county.
6. You are being responsive to the wishes of a select few of the affected people in the county (voters).
7. You do not intuitively feel that more retail space is needed in the county – that the proponents of the change are absolutely wrong.

THE WINDGATE ATTORNEY

You represent the interests of the residents of the Windgate Housing Development. You should *support* the arguments of the County Planners. In addition, you should point out the following views expressed by the residents whom you represent:

1. A residential neighborhood is not a place for through traffic, and certainly should not be allowed to accommodate the number of vehicles projected by the planners.
2. When the residents bought their homes, they did not expect anything of this magnitude and feel the County Council will do them an injustice if they adopt this change.
3. The residents will suffer, but the entire county will benefit.
4. The residents feel that the amount of retail space in the county is ample, at least for the next five years. They are content to shop at the Windgate Shopping Center, the Townson Shopping Center, and the Crestwood and Baytown centers.
5. If the plan is adopted by the Council, the residents have hired you to contest the change through the courts. This will likely take two years, at which time the backers of the shopping center will probably not find it desirable any longer to locate the center there. The residents feel, consequently, that the backers of this shopping center should seek a location further out in the county, at a place that will *anticipate future growth*, and that will be more suitably consistent with the long-range General Plan of the County.
6. It is an absolutely untenable position for these residents since

their tranquility may be violated by this shopping center – *a shopping center which is backed by the Williams Construction Co. – who happened to support Ms. Hinds in the last election!* How is it that Ms. Hinds and her husband, a small tombstone retailer, can afford to live in a $100,000 house, and maintain four late-model cars? We feel that the voters are being railroaded by Ms. Hinds and some 1920 back-room politics!

THE PLANNER

Your role is that of a professional planner working for Layne County. Your major task has been to propose yearly (or at other intervals) zoning maps that are in accord with the General Plan – a plan that recognizes certain long-range planning goals. The zoning map recently presented to the Council – the one which Ms. Hinds has objected to – reflects the long range goals of the General Plan. Your task in this hearing is to present to the Councilman your *objections* to the change suggested by Ms. Hinds.

Accordingly, you should point out to the Councilman that:

1. The new shopping center is not consistent with the General Plan, that is, it is a direct violation to the plan in that new retail functions are allowed west of I-91.
2. If the change is adopted, an estimated 8,000 to 12,000 vehicles a day will pass the I-91 and Perrytown road intersection. To accommodate this traffic several changes in the road and utility system will need to be made.
3. If the change is adopted, there will be numerous costs encountered: (a) an extension of Ridge Road to allow access to the shopping center through the Windgate Housing Development, (b) alteration of the interchange at Perrytown Road and I-91 to accommodate the expected new level of traffic, (c) widening Perrytown Road from west of the proposed shopping center to Harris Road, (d) study and alteration of the traffic light system, (e) extension of public utilities to accommodate the new facilities, and others. It is estimated that road change costs will be nearly $2,000,000 and utility changes about $800,000.
4. The adoption of this change will not only affect the immediate area, but will eventually alter the overall vehicular traffic pattern in the county – this will require extensive study and ultimate revision in the road system throughout, at costs yet undetermined.
5. It is likely that the quality of the residential areas around the proposed shopping center will decrease.
6. To mix land uses such as this, we take away from the tran-

quility of the residential neighborhoods, which is counter to the philosophy of any professional planner.

MS. HINDS

You represent District 7 on the County Council, but in the past election, you did not carry this district – you were elected county-wide. In the past election you relied heavily on campaign funds donated by the G. C. Williams Construction Company. This construction company built the portion of I-91 that runs through your district. As a result of this construction job, the company secured an 80-acre site on the southwest corner of the I-91 and Perrytown Road interchange to obtain roadbed materials. After your election, the construction company suggested to you that you owed them a favor for their backing your campaign, and have suggested to you that their site should be zoned for a modern retail shopping center. To your knowledge, no one knows of this arrangement, and you prefer, obviously, to keep it this way. Furthermore, the company has promised to support your next campaign if you work with them on this. Your influence on the Council should be exercised and you should *oppose* the zoning map of the planners and present to the Council your own zoning map. This you have done, and your task in the hearing is to present your arguments to your fellow councilmen.

In your arguments, you should point out that:

1. The county is a growing, progressive county, and to maintain this in fact and image, a new, large, and multi-department-store shopping center is needed.
2. A shopping center will create at least 500 new jobs and certainly will eclipse this number after fully established.
3. A new shopping center of this size will attract customers from adjacent counties, Center City, and even from the state to the north.
4. Although there will be costs for changes in the roads and for further utility development, the tax revenues and new jobs created (along with new population influx) will certainly be offsetting, and *by completion of the project*, the county will be ahead.
5. You recognize that if you fail in getting this proposal adopted, it may mean your political future. Thus, you realize that to achieve this goal, you must resort to political favoring. *During the recess,* make every effort to pull the Councilman aside, and offer him this deal: if he rules in favor of the proposal, tell him you can guarantee that his campaign fund for the next election will be completely taken care of, and he

can be virtually assured of re-election. If he seems reluctant or refuses, tell him that you are prepared to disclose at the hearing certain of *his* wrong-doings, namely, that early in his tenure in office, he let several road-paving contracts to his own firm against the advice of his o n budget officer (which is not general county knowledge).

SUGGESTIONS FOR THE TEACHER

The successful completion of this game requires the teacher to have introduced the students to the overall aspects of land use, types, geographical patterns, zoning (how it relates to the general plan, and exceptions), and the centrifugal and centripetal forces affecting land use. It also requires the students to be familiar with the ideas of role playing in a simulation activity. Careful coaching by the teacher may be desirable.

Before the game is played it is frequently helpful to ask the students to read one or several newspaper articles that deal with a zoning issue concerning their own area. For example, articles such as "Politics Weigh Too Heavily in Zoning, Many Say," in the *Atlanta Journal and Constitution*, Sunday, August 8, 1971, have been used. Readings of this sort tend to acquaint the students with a real-world problem, and makes the operation of the game more meaningful. The role of the geographer as a good citizen can also be brought out.

A very general approach is taken in the game; specific data and facts are missing. This is by design. A frequent result of the game is student inquiry concerning what the real facts are relative to their own local area. This prompts questions concerning data sources, and at this juncture the teacher can extend the activity to include data searches into a number of census sources. Population totals, growths, and demographic characteristics can be obtained from the *1970 Census of Population*. For large metropolitan areas Major Retail Center data can be obtained from the *1974 Economic Censuses*, as can total county business patterns. The *1970 Census of Housing* also contains useful information for counties that go to make up SMSAs. Local sources – the County Planner, Chambers of Commerce, study groups, and others – can provide local data to round out the picture.

8

The Census of Canada

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Wilfred Laurier University

Before the Confederation of Canada in 1867 numerous censuses were taken in the colonies. The earliest was in the colony of New France in 1666. Following Confederation a decennial census was established beginning with 1871, and the census has been taken every ten years since that date. During the rapid development of the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) a census was also taken in every year ending in six, from 1906 to 1946. In 1959 the mid-decade census was extended to include all provinces. Therefore, since 1956 a Canadian census has been taken every five years; however, the decennial censuses of 1961 and 1971 contain a broader range of information than those of 1956 and 1966.

Although the censuses are published in sections and are released to the public as each section is completed, recent publications are nearly five years out of date when they become available. It was expected that all the 1971 Census volumes would be completed by the end of 1974; however, by that date only four of the seven volumes had been published, and it is likely that the remaining volumes will not be released before the end of 1975.

1971 CENSUS

The 1971 Census is being published in four main report series:

1. The *Advanced Series* provides summary information of specific topics which have a high demand. This series is published before the volume series and lacks any detailed data breakdowns.
2. The *Volume Series* contains the main statistical results of the 1971 Census. This series is described in detail below.

3. The *Census Tract Series* presents population, housing, household, family, and labour force characteristics for the census tracts of the thirty largest urban centres and census metropolitan areas of Canada.
4. The *Special Series* contains statistics which provide additional data for more specialized subject matters or more detailed information per areal unit.

VOLUME SERIES

Since the Volume Series is the portion of the census which is most readily available to the teacher, it is described in some detail. The series contains seven volumes each with several parts. Each part is composed of individual reports. A catalogue of the reports and their contents can be obtained from Statistics Canada, Ottawa, Ontario K1A 0T6.

Volume One, Population, is composed of five parts. Part 1 is entitled *Geographic Distributions* and contains population totals for areas such as provinces, electoral districts, census divisions, and municipal subdivisions. Included in Part 1 are reports on rural and urban populations, historical tables on population growth, and reference maps.

The maps are of four types: first, a map of Canada showing census divisions; second, a series of maps of the provinces showing the census divisions in each province as well as the townships, municipalities, parishes, and other organized municipal subdivisions; third, a series of maps of the census metropolitan areas showing the census subdivisions and municipal units; fourth, a series of maps of census agglomerations of 25,000 population or over showing census subdivisions and municipal units.

Part 1 also contains a report on census tract units for the thirty largest cities and census metropolitan areas. Census tract maps are included for all thirty cities and areas.

Parts 2 and 3 are entitled *General Characteristics*. Part 2 provides information for various sizes of census units for such basic population characteristics as sex, age, marital status, fertility, internal migration, and schooling. Information concerning ethnicity, religious denominations, language, place of birth, citizenship, and immigration can be found in Part 3.

Part 4, *Cross-classification of Characteristics*, presents information about the population by census divisions. Examples of the cross-classification are marital status by age groups, language by age groups, religious denominations by age groups, language by place of birth, and characteristics of immigrants.

Part 5, also entitled *Cross-classification of Characteristics*, tabulates similar types of information as Part 4, and also characteristics such as schooling and migration (including migration by labour force activity and occupation, fertility, and nuptiality).

Volume Two, Households, contains four parts and provides information concerning households, families, and housing characteristics. Part 1, *Households*, has data on the size and composition of households and cross-classification concerning the head of the household, such as place of birth, schooling, income, ethnic groups, and occupation.

Part 2 focuses on the family unit providing data concerning the size and composition and cross-classification by schooling, income, place of birth, occupation, and others.

Parts 3 and 4 have information on housing characteristics, the former focusing on housing distributions by tenure, structural type, number and types of rooms, number of persons per room, age of structure, and rents and values. Part 4 includes data concerning such characteristics as water supply, sewage disposal facilities, refrigerators, television, automobiles, and cross-classifications by tenure and structure.

Volume Three, Economic Characteristics, has seven parts and is concerned with the labour force and incomes. Data concerning the age, sex, marital status, and schooling of the labour force can be obtained in Part 1, *Basic Distributions*. Participation rates, experience, and wages and salary income are also included.

Part 2, *Occupations*, formats cross-classification by occupation, including historical data, rural non-farm and rural farm populations, and for urban units of 10,000 population and greater. Further cross-classifications by occupation for such characteristics as sex, schooling, birthplace, ethnic group, period of immigration, and more are found in Part 3.

Parts 4 and 5 focus on the labour force by industry type. Part 4 provides basic distributions for areas for both the place of residence and the place of work, and the relationship between the two. Also included are employment totals by sex for all urban places over 10,000 population. Part 5 lists a cross-classification by industry showing such characteristics as sex, age, marital status, schooling, class of worker, and ethnic groups. Part 6 provides a cross-classification based upon individual incomes, and Part 7 is a cross-classification by work experience and work periods.

Volume Four, Agriculture, has five parts and contains census information on this subject. Parts 1 to 3 provide data concerning the number of farms, area, tenure, crops, livestock, and farm machinery, among others, for each of the provinces. Part 4 focuses

upon the socio-economic characteristics of the farm operators. Part 5 enumerates data concerning the farm operator's families, households, and dwelling facilities.

At the time of this writing, specific information was not available for volumes five, six and seven of the 1971 Census, so the following descriptions refer to the 1961 and 1966 censuses.

Volume Five, Retail Trade, provides information about retail trade and is divided into two sections, the first containing data related to location, and the second to establishments. *Volume Six, Wholesale, Trade, Services,* contains data for both wholesale and service trades with similar locational and establishment sections. Information such as the number of establishments, sales, inventory, working proprietors, and employees can be extracted for all three trades for the country and by province in Volumes Five and Six. Similar data are provided for incorporated places of 1,000 population or over for the retail and service trades and for places over 5,000 population for the wholesale trade. *Volume Seven, General Review,* is a summary of the information in the preceding six volumes.

CONCLUSION

The Canadian Census provides a wealth of information for the researcher as well as for the teacher. Its several volumes have proved useful in a number of geographical studies ranging from agriculture, central place, industry, to service-oriented activities in the country. An idea of its usefulness as a source in teaching activities can be seen in the essay by Putnam elsewhere in this book. Users of the Canadian Census might also find *A Statistical Profile of Canadian Society,* by Daniel Kubat and David Thornton (Toronto: McGraw-Hill Ryerson, Ltd., 1974) a good companion for the census.

9

The Use of Vital Statistics in Geography

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Vital statistics are concerned with deaths, fetal deaths, births, marriages, divorces, and at times disease and illness (morbidity). Although vital statistics are used most extensively in the fields of demography and actuarial science, researchers in the field of geography, and particularly in the subfield of medical geography, are using them more and more. The objectives of this essay are to (1) briefly delineate those materials included in the *Vital Statistics of the United States* which have, in the past, been highly applicable to the research and teaching endeavors of the geographer, (2) outline the statistical limitations and reliability of the material, and (3) suggest, from the geographer's point of view, how this material might be improved.

VITAL STATISTICS OF THE UNITED STATES

The collection of vital statistics in the United States on a national basis was first attempted in connection with the census of 1850. The census enumeration method was used, in part, until the 1900 census when the federal government began its annual collection of mortality statistics under the registration system. It was not until 1933 that national coverage was obtained for both birth (natality) and death (mortality) statistics. Although the birth and death registration programs are complete, marriage and divorce registrations do not yet include all the states. These areas were not established until 1957 and 1958, respectively. Independent and state statistical offices forward certificates to the National Center for Health Statistics. This agency serves as the center for collec-

At the time this was written, Mr. Drago was a graduate student in the Department of Geography, Georgia State University.

tion, analysis, and distribution of national vital statistics for the United States.

The forerunner of the present-day *Vital Statistics of the United States* was formed in 1937 by combining the volumes of mortality and natality statistics. The format of the publication was changed in 1960 to include three volumes: Volume I, *Natality;* Volume II, *Mortality,* Parts A and B; and Volume III, *Marriage and Divorce.*[1] A considerable time lag occurs between the collection of data and publishing the final reports in these volumes, ranging from sixteen to eighteen months for births and deaths to twenty-four months for marriages and divorces. Preliminary sample data are published in the *Monthly Vital Statistics Reports;* summaries of the final vital statistics for each year are also released in this publication well ahead of the appearance of the full volumes.

The data in the mortality volume are based on 100 percent of the deaths occurring. The data for the birth volume, however, are based on a systematic 50 percent sample. Likewise, a sampling procedure is used for marriage and divorce certificates which results in samples of at least 2,500 and 1,000 per state, respectively.

Within the volumes of the *Vital Statistics of the United States,* the presentations include the current registration area, states, counties, SMSAs, and specified urban areas. The mortality and natality volumes include a special population-size group classification. The marriage and divorce volumes contain national, regional, state, registration, and county areas.

VOLUME I – NATALITY

Birth rates are given for the entire United States and the fifty largest SMSAs and their component counties. They have been classified by race since 1915 for the birth-registration states, and since 1933 for the United States. Birth rates adjusted for seasonal variation for the United States have been presented since 1959. Age-sex adjusted birth rates, by race, have been included since 1940. The registration of births is now comprehensive.

VOLUME II – MORTALITY, PARTS A AND B

Statistics concerning mortality are of considerable concern to

[1] U.S. National Center for Health Statistics, *Vital Statistics of the United States 1968,* Vol. I, *Natality* (Washington, D.C.: 1970); idem, *Vital Statistics of the United States 1967,* Vol. II, *Mortality,* Part A (Washington, D.C.: 1969); idem, *Vital Statistics of the United States 1969,* Vol. III, *Marriage and Divorce* (Washington, D.C.: 1972). Each of these volumes includes a Technical Appendix which describes in more detail the manner of collection, processing, and dissemination of vital statistics.

the geographer. He is interested in the age-adjusted, age-specific, and cause-specific death rates. These are included in Part A for regions down to the state level. Infant and neonatal rates (death rates occurring during the first twenty-seven days of life) are in Part B. Rates are not available for many of the geographical areas presented (as is the case for many birth categories).

Although registration of deaths is nearly complete, there are several limitations on the use of mortality statistics.[2] Cause of death can be misleading since changes have been made decennially in the *International Classification of Diseases*. However, comparability ratios are published for use in trend studies. A way to minimize this problem is to use broad classifications of causes of death.[3]

Another source of error is the incompleteness in cause of death reporting on death certificates. Since multiple cause of death coding is not yet practiced, much information concerning true cause of death is not utilized. Diseases often occur together; biases in reporting the underlying cause of death frequently result. It is difficult to measure and use the concept of prevalence of disease (the number of cases of a disease in a population at any given time) because some diseases that were at one time fatal may no longer be so. Instead, the study of the causes of trends and distribution patterns is best served by statistics of incidence (those which express the frequency with which diseases arise during a defined period of time).

Mortality statistics, as well as most vital statistics, are limited by unsatisfactory current population estimates at the local level. This is particularly true for minority, nativity, and marital status groups. It is well known that death rates vary significantly with age, sex, and race. Unfortunately, population estimates are available each year in only five broad age groups. Available estimates of the total population of counties and SMSAs are not classified by age. National and state statistics are subject to less inaccuracy than these smaller geographical units. Furthermore, death rates for whites are generally more reliable than those for non-whites because of under-numeration and under-registration of the latter.

Geographers study mortality statistics to identify conditions in an area which might affect mortality levels. However, it must be recognized that in a mobile society such as ours, many residents of

[2] For a discussion on the quality and reliability of vital statistics see Malcolm A. Murray, "The Geography of Death in the United States and the United Kingdom," *Annals*, Association of American Geographers, Vol. 57 (1967), pp. 301-314.

[3] Mary Griffiths, "A Geographical Study of Mortality in an Urban Area," *Urban Studies*, Vol. 8, No. 2 (1971), pp. 111-120.

a certain area may reflect the influence of conditions existing in their prior places of residence. Also, current mortality is affected by conditions existing at earlier times in the same area. Problems may arise in the use of statistics on fetal and infant deaths because of differences between reporting requirements and practices between states. Other factors that may affect mortality rates are hospital utilization, level of medical care, frequency and quality of autopsy, and socio-economic characteristics. Improved diagnosis, new antibiotics, drugs, treatment methods, and surgical methods make it difficult to study historical trends of disease patterns.

VOLUME III – MARRIAGES AND DIVORCES

Rates are provided for states in this volume, and like the mortality statistics, there are several shortcomings in the current marriage and divorce statistics. These result from a lack of nationwide standardization of procedures and forms in reporting essential information, especially race. Also, all states are not included for marriage and divorce. Few geographers have used these statistics in their research.

OTHER SOURCES

There are numerous sources that provide provisional statistics and supportive information to the *Vital Statistics of the United States.* These are important because of the time lag required to publish this annual volume, and because they provide additional tabulations and analytical studies concerning vital statistics.

Provisional statistics on vital events for the nation, regions, and registration areas are published by the National Center for Health Statistics in the *Monthly Vital Statistics Report.* Here the time lag is about thirteen weeks for death data and eight weeks for other data. The *Vital and Health Statistics Series* consists of more than 300 reports presenting data from the various data systems of the Center, including *Vital Statistics.* It also contains analytical studies, program description, and statistical methodological reports.

Preliminary data on a weekly basis is presented in the U.S. Communicable Disease Center's publication entitled *Morbidity and Mortality Weekly Report.* This provides information on selected notifiable diseases and mortality, by cause and age groups, for 121 cities. The time lag is one week, and an annual supplement is included. Another report by the same agency, *Reported Tuberculosis Data,* includes yearly national data on tuberculosis morbidity and mortality. New York City also publishes weekly

vital statistics. The U.S. Bureau of the Census also publishes a number of documents which contain vital statistics as well as sources of important collections of vital statistics. Complete lists of these and previously mentioned publications may be found in several sources.[4]

A two-volume publication which adequately describes the processes involved in the collection, classification, and processing of population data is *The Methods and Materials of Demography*.[5] Valuable periodicals are *Population Index*, *Demography*, *Milbank Memorial Fund Quarterly*, and Metropolitan Life Insurance Company's *Statistical Bulletin*.

States and larger cities prepare extensive tabulations of vital statistics data.[6] Much of the data are published in annual reports, and more in computer tape form. A greater amount of geographic detail is available in state publications as they usually contain data for counties and smaller urban places.

The major source of national morbidity statistics is the *Health Interview Survey* carried out by the National Center for Health Statistics. The publications of the Center for Disease Control, previously mentioned, are another important source. Internationally, many countries and such agencies as the United Nations and World Health Organization publish periodicals, yearbooks, and annual reports on vital statistics. However, international comparisons are difficult since the availability of vital statistics is incomplete and unreliable for much of the world.

PREPARATION OF DATA FOR GEOGRAPHICAL ANALYSIS

Geographical studies normally contain vital statistics that are in the form of rates or ratios. The methodology for computing the several indices can be found in various demographic volumes or census publications.[7] Four types of rates and ratios are widely used in geographic studies: crude birth and death rates, rates

[4] John L. Androit, *Guide to U.S. Government Statistics*, 4th ed. (McLean, Virginia: Documents Index, 1973); and Marilyn Anne Jensen, "Selected Sources of Current Population, Vital, and Health Statistics," *Bulletin Medical Library Association*, Vol. 60 (1972), pp. 14-21.

[5] U.S. Bureau of the Census, *The Methods and Materials of Demography* (Washington, D.C.: Government Printing Office, 1971), 888 pp.

[6] Anders S. Lunde, "Vital Statistics Publications of the Registration Areas of the United States," *Population Index*, Vol. 36 (1970), pp. 125-147.

[7] U.S. Bureau of the Census, op. cit., footnote 5; U.S. National Center for Health Statistics, *Vital Statistics Rates in the United States, 1940-1960*, PHS Pub. No. 1677 (Washington, D.C.: Government Printing Office, 1968); and R. W. Armstrong, "Standardized Class Intervals and Rate Computation in Statistical Maps of Mortality," *Annals*, Association of American Geographers, Vol. 59 (1969), pp. 382-390.

specific for age, sex, occupation (and other), age-adjusted, and the standardized rates. *Crude rates* are obtained by dividing the total number of occurrences by the total population. Since these give a summary measure for the entire population and do not take into account the segments of the actual population with higher risk, sizable segments of the population with rates quite different from the average may be masked. Thus crude rates should be used only in comparing rates for communities which have similar age and sex composition, or for trend studies of the same community over a short time period. They should not be used when studying certain diseases, such as tuberculosis, which are not widely prevalent, but are usually clustered within certain segments of the population. It should be pointed out that many publications use the adjective "death" for rates in which the denominator is a population number and "mortality" when the denominator is something other than a population (for example, all deaths or all live births).

To describe detailed categories of vital events, *specific rates* may be calculated using such characteristics as age, sex, occupation, education level, ethnic group, or cause of death. An age-specific death rate can be calculated by dividing the number of deaths of persons of a given age during a year, per 1000, by the total midyear population of that age. This is valuable since the occurrence of most diseases is selective by age, sex, and race.

The effect of changes in the age composition of population from year to year is eliminated in *age-adjusted* death rates by applying current age-specific death rates to a standard population of unchanging age structure, such as that of the United States in 1940. This can be done for other variables as well. The resultant rates are useful only for comparison and share with crude rates the weakness that they are single numbers which cannot summarize adequately the pattern of variation in the age-specific rates.

A *standardized death rate* is the ratio between the observed number of deaths and the number that would be expected if the age/sex-specific death rates were the same as those for the population of the nation as a whole. Since these are computed with reference to a national norm, SDRs for different geographical areas would be directly comparable. This method is widely used internationally, especially among the British geographers.[8]

GEOGRAPHICAL ANALYSIS OF VITAL STATISTICS

Geographers believe the distribution patterns of diseases to be

[8] For example, see Melvyn G. Howe, *National Atlas of Disease Mortality in the United Kingdom*, rev. ed. (London: Thomas Nelson and Sons, Ltd., 1970).

affected by the physical, biologic, and socio-economic environments. Environmental circumstances can affect the incidence of diseases, but to imply a relationship between disease and environment and to identify and measure the influence of the most important factors is not an easy task. In most cases environmental factors are potentially very numerous and typically operate in a strongly interrelated manner. Because of these reasons and the decline of infectious diseases in advanced urbanized societies, the field of medical geography, defined by Dr. Jacques May as the ecology of human disease,[9] has shifted towards such matters as (1) mapping chronic disease patterns (heart disease and cancer) and relating these to socio-economic differentials and environmental factors (trace elements in soils),[10] (2) performing spatial-temporal studies to understand mortality in relation to the characteristics of the population and environment,[11] (3) relating the spread of infectious diseases to changing cultural patterns,[12] (4) identifying low and high risk areas within communities,[13] (5) analyzing and mapping quality of life within defined areas,[14] and (6) analyzing the spatial-temporal aspects of disease incidence to plan efficient health care facilities and measure the adequacy of present facilities as far as service and accessibility to the population are concerned.[15]

The spatial analysis of disease patterns usually begins for the geographer with the mapping process.[16] Either absolute numbers, but preferably rates or ratios, are ranked for geographical areas,

[9] Jacques M. May, *The Ecology of Human Disease* (New York: MD Publications, 1958). See especially the Introduction.

[10] Gerald F. Pyle and Philip H. Rees, "Modeling Patterns of Death and Disease in Chicago," *Economic Geography*, Vol. 47 (1971), pp. 475-488.

[11] John Florin, *Death in New England: Regional Variations in Mortality* (University of North Carolina, Chapel Hill: Department of Geography Studies in Geography No. 3, 1971), 172 pp.

[12] Gerald F. Pyle, "The Diffusion of Cholera in the United States in the Nineteenth Century," *Geographical Analysis*, Vol. 1 (1969), pp. 59-75.

[13] G. E. Alan Dever, "Leukemia in Atlanta, Georgia," *Southeastern Geographer*, Vol. 7 (1973), pp. 91-100.

[14] S. H. Bederman, "Stratification of Quality of Life in the Black Community of Atlanta, Georgia" (unpublished paper presented at the meetings of the S.E. Division of the Association of American Geographers, Boone, N.C., November 18-20, 1973), 12 pp.

[15] Gerald F. Pyle, *Heart Disease, Cancer, and Stroke in Chicago* (University of Chicago: Department of Geography Research Paper No. 134, 1971), 292 pp.

[16] Two of the foremost references for disease mapping are N. D. McGlashan, (Ed.), *Medical Geography Techniques and Field Studies* (London: Methuen & Co., Ltd., 1972), pp. 43-85, 113-152; and Howard C. Hopps et al., *Computerized Mapping of Disease and Environmental Data*, A Report of the Mapping of Disease Project (AFIP Washington, D.C.: 1969), 419 pp.

divided into a number of categories (usually between 3 and 10) and mapped. The mapping statistics used should be based on a time period of at least three years, and preferably more. Care should be exercised to make certain that rates or ratios have been developed from a significantly large population (usually thirty or more deaths or births). For these reasons, it often will not be possible to use areas such as counties or smaller areas even though these would be more sensitive to geographic variation than larger areas. If statistically feasible, small areas are preferable as study units since they tend to be more homogenous in respect to population characteristics. More qualified inferences could then be made.

Maps provide an excellent way to obtain a quick, intuitive idea of the spatial significance and content of large amounts of data. From the visual impression of the distribution pattern and knowledge of the mapped area, hypotheses may be developed, as well as tested.[17] However, difficulties arise for the geographer attempting to explain these patterns. Apparent correlations at one scale may not hold at another since few areas are completely homogeneous. This might also apply when data is grouped in social or other aggregates and then related to the attributes of individuals. Another problem is studying the relationship between chronic disease and environmental effects; long latent intervals (as much as fifteen or more years) may occur between the onset of a disease and the manifestations of its effects. Combined with the high mobility of our population, this makes analysis very difficult without information from surveys. When studying historical differences these problems can best be minimized through analysis in which the experience of a succession of generations (or cohorts) is traced over their life course.

A summary index for quality of life which can be used to distinguish population groups is an attractive one. When infectious diseases were the major component of mortality, infant mortality rates were reasonably good indices of overall health, but with the emerging importance of chronic and disabling diseases, morbidity becomes a more important indicator of the general level of health. At the present time morbidity statistics are generally less reliable than mortality statistics, thus mortality statistics still provide the best indicators for many specified disease problems and the health of the population as a whole.[18] Comparisons of health status in different geographic areas or other sub-groups of the population

[17] Philip Cole, Brian MacMahon, and Alan Aisenberg, "Mortality from Hodgkin's Disease in the United States," *Lancet*, Vol. 295 (1968), pp. 1371-1375.

[18] David Mechanic and Margaret Newton, "Some Problems in the Analysis of Morbidity Data," *Journal of Chronic Diseases*, Vol. 18 (1965), pp. 569-580.

point to differences in risk of disease due to biological and environmental differences, to differences in availability, or use of health services.

NEEDS FOR THE FUTURE

Specifically, what is needed are statistics for census tracts, blocks, and for some diseases, such as tuberculosis, incidence rates for populations defined by socio-economic characteristics.[19] Only with information available on small homogeneous areas can definitive inferences be made. Other areas for which vital statistics data are needed are in inner city areas and by economic areas.

There are presently few national statistics by socio-economic indicators. Education would provide a highly significant measurement for mortality analysis. Better information linkage between vital and census data would be most useful to study communities and neighborhoods.[20]

Specific measurements on the various types of environmental pollution are needed to relate this problem to the health status of the population. From these the risk of mortality and morbidity by type and level of pollutant could be determined. A general index sensitive to changes in life styles, quality of life, and changing health status of the nation's population would facilitate comparisons of geographical areas on a general level and for planning purposes.

Finally, we must realize that while diseases may be controlled, few can be totally eradicated.[21] There is a fine line between endemic – an existing condition in which a disease is confined either permanently or temporarily to a particular geographic region or population – and epidemic situations. Whatever contribution geography can make in the surveillance of diseases through use of the mapping technique or other methods of spatial analysis will be important.

[19] Reuben Kyes and Sheldon Zuckerman, "Tuberculosis in Suburbia – New Indices for an Old Disease," *American Journal of Public Health*, Vol. 62 (1972), pp. 1586-1589.

[20] Estelle Siker et al., "The New Haven Health Information System: A Model for Relating Health and Census Data," *Inquiry*, Vol. 8 (1971), pp. 58-62. Here, it was found that census tract statistics concealed diversities that were revealed by block group analysis. This project is a primary example of how linked data may provide studies of higher quality and reliability.

[21] James F. Jekel, "Communicable Disease Control and Public Policy in the 1970's – Hot War, Cold War, or Peaceful Coexistence?," *American Journal of Public Health*, Vol. 62 (1972), pp. 1578-1585.

CONCLUSION

It has been shown here that there are limitations in the use of vital statistics. At the present time the display of spatial variation of disease by the mapping technique is the geographer's primary contribution. Statistics for smaller geographical bases are needed, as well as rates computed for those statistics published annually. Continuing efforts must be made to improve registration.

10

Population Models in the High School

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A group project can be one of the most effective of learning experiences, combining as it does growth in concepts, attitudes, and skills. The ease with which projects lead into discussions of problems and generate new questions ideally favors integration into the curriculum through structured learning stages. Attitudes of cooperation, social responsibility to a group, a sense of concrete achievement, and the satisfaction of reaching goals can be products of a successful project. Other products may include new perceptual frameworks, understandings of a lasting nature, and acquisition of techniques and skills. Projects can be especially useful for leading students to involvement with contemporary issues and problems, and for helping them see the usefulness and immediate relevance of what they are learning.

Of the sundry and numerous forms of projects and group exercises, model building is one of the most under-utilized and, in terms of its teaching potential, most neglected. Models are usually three-dimensional, tactile, and concrete. They can be made and formed. They lend themselves to a multi-sensual learning process in which the students can be involved in tactile, visual, and physically creative stimulation.

Although the idea of the model itself has many applications, the purpose of this essay is to introduce teachers in the social sciences specifically to the use of population models. Population geography and its co-field, demography, are concerned with variations in the density and distribution of human population, as well as variations in its characteristics and composition.[1]

Reprinted, with changes, from the *Journal of Geography*. The authors wish to thank Karl Blasius of Michigan State University for effecting the Michigan and Detroit transformations.

[1] See, for example, the NCGE "Teachers' Resource Materials" publication: *Geography of Population, A Teacher's Guide* (1969), P. F. Griffen, ed., to be ordered directly from Fearon Publishers, 2165 Park Blvd., Palo Alto, California 94306.

What people are, where they are, and in what numbers and what conditions, is an existing reality which underlies and explains many of the world's food, power, economic, and political problems, both in their historical development and in their contemporary form. Basically there are three demographic processes: fertility, mortality, and migration. In addition, understanding is gained not only from knowledge of the absolute numbers involved, but also from realization of the characteristics, both ascribed and achieved: sex, age, race, educational attainment, marital status, mobility, and many others. These processes and characteristics are relevant to socio-economic development at all levels among all societies. Urbanization, for instance, is a form of demographic change which has implications for cultural change and the fabric of socialization, for family planning, housing and health, for economic development, and for political processes as well.

While demography is by definition the study of people, it continues to use largely traditionally representational models, especially the choropgraphic map of territory. Maps are constantly used to portray the proportion unemployed, the proportion dying of cancer, the proportion black, the proportion voting a certain way. While these maps do effectively portray a spatial reality of their own, and are essential, they cannot do justice to quantum differences in population. If 20 percent of the Alaskan population has a certain disease, and only 5 percent of the New York population is so stricken, where is the greater need for doctors? Model building can be used to transform a map to represent population, making the area of the cartogram proportional to the number of people. These transformational models fall into two types: flat and vertical. The first type is effected areally in two dimensions and the second volumetrically in three dimensions. Simple models represent total populations whereas more advanced models can be age- and sex-specific. Scale of application may range from global or continental to national or local.

SEQUENCE OF GROUP ACTIVITIES

The object of making a model of population is to create an awareness of population geography, the distribution and attributes of population, and their changes through time. Teachers may find the following suggested group activities helpful in planning their own projects:

STAGE 1: TEAM FORMATION

Five teams of six pupils each could be formed in a typical class. In assisting the formation of teams, the teacher should bear in mind both compatible and complementary skills of students so as to make each team as independent and self-supporting as possible.

STAGE 2: GENERATION OF IDEAS

The purpose of models and their nature should be discussed, and examples of possible models suggested. The class then could decide which dimensions of time, scale, and attributes are to be represented. They may decide, for instance, that they are especially interested in urban problems – or in rural, racial, economic, or political problems, depending on the problems of which they are aware, and which seem most immediately important to them. The teacher could attempt to link the groups through variation in scale on the same problem (i.e., continent, country, state, and city), or by inter-related and thematically linked problems, such as the many aspects of urban growth and decay in America.

STAGE 3: DATA COLLECTION

Teams can collect their own data. This may require contacting city hall or state offices, writing embassies, or, for some advanced classes, even field observation. It will usually require library consultation, with perhaps an initial introduction of students to national census reports and to United Nations publications.

STAGE 4: DATA COLLECTION AND ANALYSIS

Construction of a model requires systematic and thorough preparation in which the students proceed step-by-step. Data must be selected, aggregated, and suitably systematized by numbers and unit areas. Rarely will information be available in exactly the required form.

STAGE 5: PREPARATIONS FOR BUILDING

The total number of building blocks to be used must be established, color-coded, and planned so that no two contiguous areas will have the same color; for this the number of blocks of each color must be determined. Materials needed, such as blocks, maps, graph and drawing paper, must be calculated and procured. Advance preparation in bulk by the teacher will minimize delay.

STAGE 6: MODEL BUILDING

The building of the model itself may be done in one long span or in several shorter ones, whichever is convenient to the class. The exercise satisfies a wide range of group needs, varying from manual creativity to conceptualization of social problems as the model emerges.

HOW TO BUILD A FLAT MODEL

A model is basically constructed by the accretion of small blocks until proportional shapes are mutually adjusted as accurately as possible.[2] The first step is to make the small wooden blocks. For each of the projects described farther on, nine thousand blocks were used. Blocks 1/4-inch thick were sawn from 1/2-inch hardwood strips and dyed in primary colors (red, black, green, blue, with white undyed). Plastic blocks or ceramic tiles would also be suitable, but more expensive.[3] Since shape can best be retained by using the maximum number of blocks, in each model the total population was divided by nine thousand to derive the population representation of each block. In the African project, for instance, a total population of 341.4 million was divided by 9000 to give a representation of 38,000 per block (Figs. 10-1 and 10-2). Blocks were then added to each other, using colors to differentiate adjacent countries. The completed model of Africa was approximately six feet wide and took about twenty man-hours to construct, beyond preparation and block counting.

One absolute, rigidly held criterion, is the maintenance of representation of population size, with total area being proportional to total population. This transformation to a demographic rather than a territorial base results in distortion of size, and construction difficulties ensue in retaining (1) contiguity and (2) shape. Densely populated units expand, sparsely settled ones collapse, and frequently the collapsed units must be stretched around the expanded ones. The simple accretion technique enables the model-builder to effect mutual adjustments of boundaries and shapes for contiguous countries. Once the model is constructed, the area of squared blocks is easily transferred to graph paper,

[2] John M. Hunter and Johnathan C. Young, "A Technique for the Construction of Quantitative Cartograms by Physical Accretion Models," *The Professional Geographer*, XX, 6 (November 1968), pp. 402-407.

[3] Professor Peter Gould of Pennsylvania State has drawn our attention to prepared sets of building blocks commercially available from General Research Analysis Methods in Boulder, Colorado. The blocks are hollow in both directions and can easily be moved in rows by means of inserted tubes.

Figure 10-1. Construction detail of African transformation.

each graph square representing a block. The chorographic and demographic base maps can then be placed side by side for comparison and appreciation of the aspects which each portrays best. Each corrects the distortions and misrepresentations of the other, and on this joint chorographic-demographic base almost any variable may be overplotted (Figs. 10-2-10-5).

HOW TO BUILD A VERTICAL MODEL

Vertical models cannot be used for overplotting as above, but viewed from all angles, they possess an especially effective visual impact of their own (Figs. 10-6, 10-7). The blocks prepared for flat models may be used, or else the wood may be cut into different volumetric sizes to represent population aggregations.[4] Each of the columns may be divided further to represent subdivisions or special characteristics of the population (Fig. 10-7). The major problem in construction is the different base sizes required for support of the columns. Although the model may be visually effective, utilization of different bases tends to interfere with comparison of unit areas.

[4] It is suggested that, for interdepartmental cooperation, woodshop activities may be correlated with this exercise.

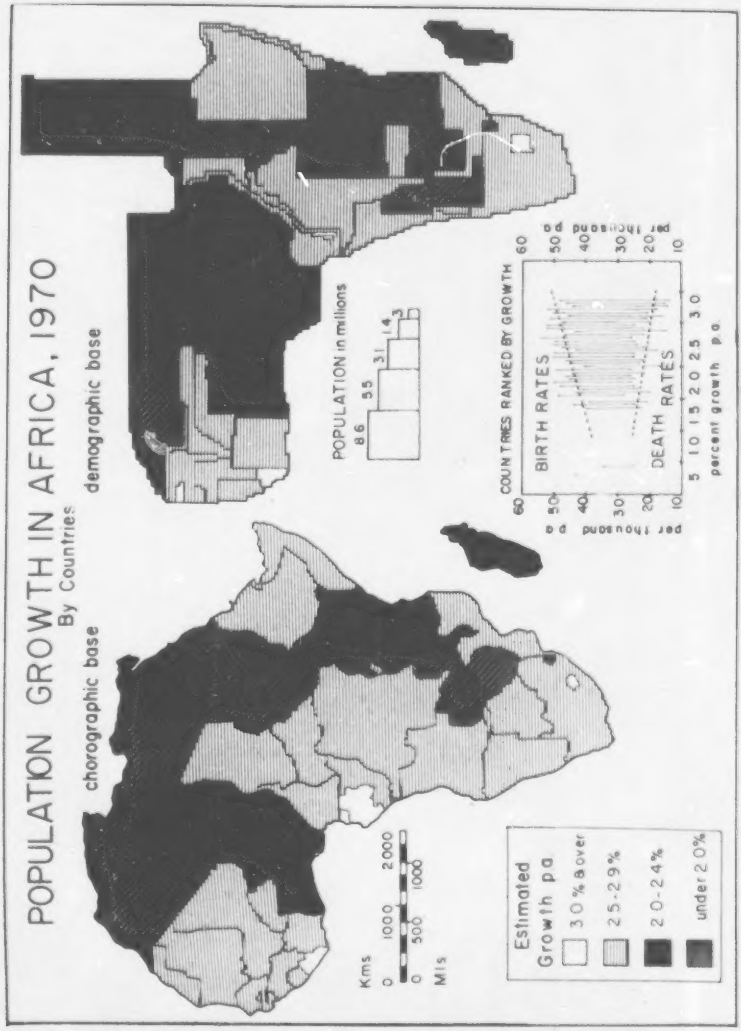

Figure 10-2. Population growth in Africa by countries on chorographic and demographic bases. Data from World Population Council estimates, 1970.

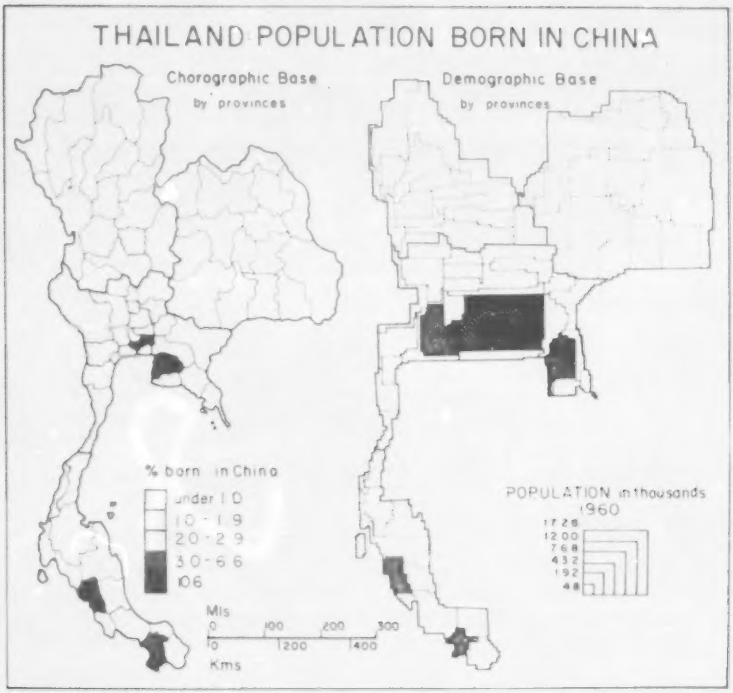

Figure 10-3. Proportion of residents in Thailand who are China born, by provinces, 1960.

HOW TO USE A COMPLETED MODEL

There is educational utility in each stage of the project. Students must divide labor, seek out data, systematize and plan, and use their creativity and imagination in the construction. The completed model lends itself to another whole range of learning activity. Each team may present its model and findings to the rest of the class, defending its analysis and interpretation in response to questions. Class discussion can be directed around the problems under consideration, explaining time-sequence changes, transformational distortions, and the realities they illustrate or misrepresent. The class may consider channels to ongoing involvement at the local, regional, national, or even world level; problems and concepts can be integrated into a context that is relevant to their own concerns. More than a formal exposition, a lecture, or a reading assignment alone, the active involvement of pupils in all stages

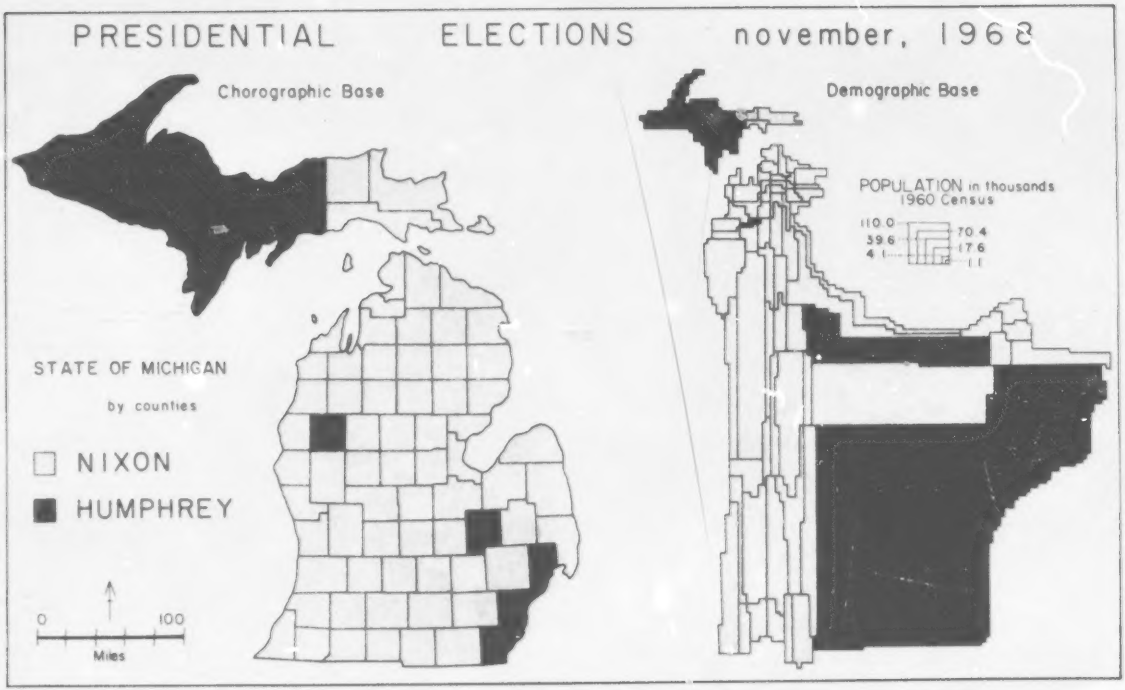

Figure 10-4. Presidential election results in state of Michigan, 1968.

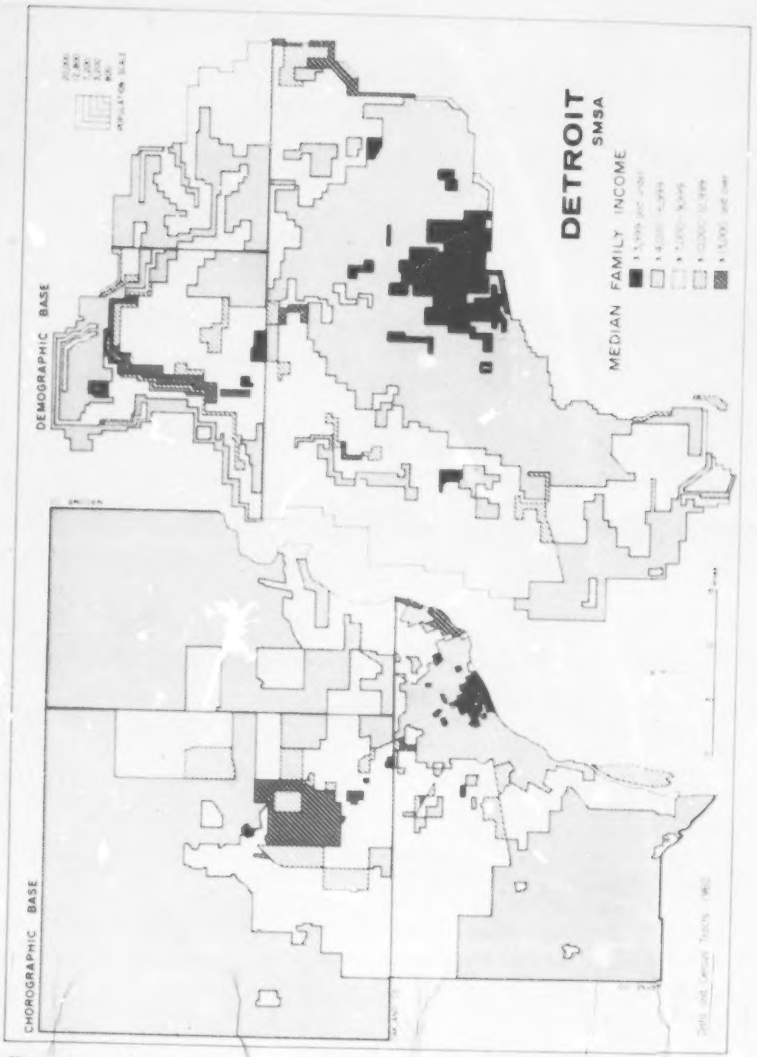

Figure 10-5. Median family income in Detroit Standard Metropolitan Statistical Area by aggregated census tract, 1960.

of preparation, construction, and analytical discussion provides a total, organic learning experience that is not easily forgotten.

Unlike the vertical, the flat model when transferred to paper will serve as a cartographic base for the overplotting of socio-

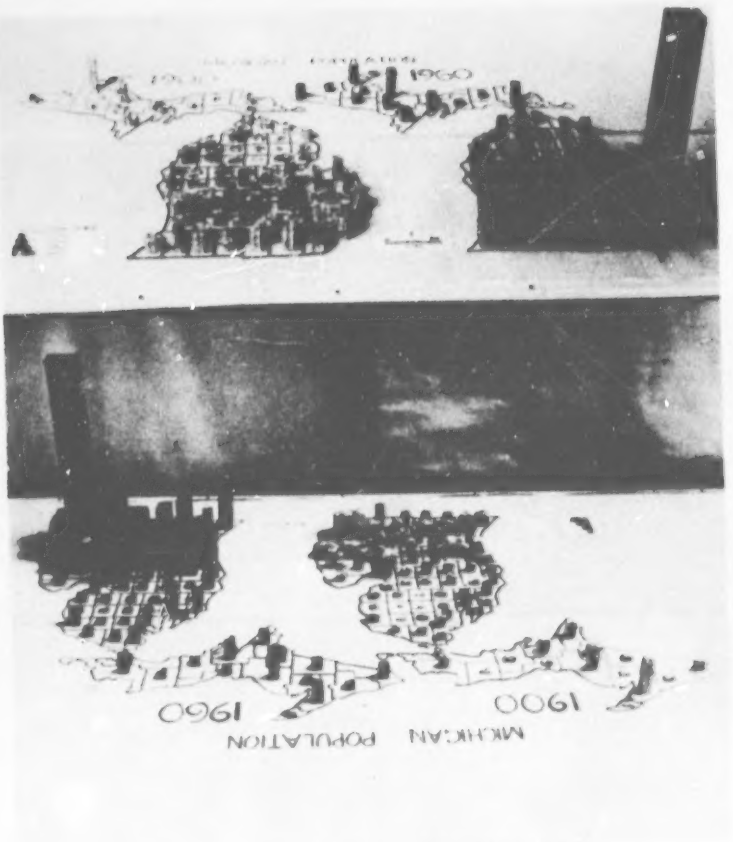

Figure 10-6. Vertical model of Michigan population, 1900 and 1960.

economic, cultural, and other variables. Hence the flat transformational model can be used to launch a series of more detailed, follow-up laboratory and seminar-type exercises if desired.

SUGGESTED PROJECTS

Free play of the imagination will suggest many projects, the range of which is barely hinted at here. For example, projects could be developed to illuminate problems of tax base, community control, school districts, or political representation of population sub-groups. Historical perspective will be gained by observing changes through time; perspectives of scale will be

Figure 10-7. Vertical model of transect, structured by age-dependency grops: under 18 (at base of column), 18-64, 65 and over (at top).

gained by areal comparisons of the same set of phenomena. The examples of transformational models which follow are drawn specifically from the field of population studies and are meant only to suggest and not in any way to limit or define. Discussion falls into two parts, concerned with flat and vertical models, respectively. Flat models have been chosen to exemplify a progression of scale from continental, through country and state, to city. Comments on each model refer to technical construction guidelines and to teaching points, in that order.

EXAMPLES OF FLAT MODELS

EXAMPLE 1

Africa, Figure 10-2, exemplifies the collapse common when sparsely settled land is represented on a demographic base. The largest national aggregation of population, Nigeria, was constructed without distortion of shape although greatly expanded in size. Other countries, such as Niger, were then stretched around it. The line of the Sahara desert, the zone of greatest collapse, was held constant and all efforts were made to preserve the outer, recognizable shape of the continent. The major exception was the

United Arab Republic which was allowed to explode into the Mediterranean, the continental shape being subordinated to the spatial relations of East Africa which would have been greatly disturbed by a southward intrusion of the United Arab Republic.

Class attention can be directed to the importance of man-environment relationships in human settlement. The large portions of arid Africa, both in the Sahara and in the Kalahari through South West Africa and Botswana, collapse, while the more hospitable, settled lands expand. The position of Rwanda, Burundi, and Malawi as labor reservoirs is clearly indicated. The population explosion resulting from the widening gap between birth and death rates is depicted in the histogram, while the map shading indicates the quantum basis of the population so growing.

EXAMPLE 2

Figure 10-3 shows the China-born population of Thailand. Construction was again started with the largest agglomeration of population, Bangkok. Along with the outer shape, an attempt was also made to maintain the shape of the four distinct regions. The constancy of the Northeast, and to a lesser extent, of the North and South, is remarkable. These are areas of intensive subsistence farming with rather uniform population density. They illustrate the inappropriateness of choosing models in which demographic and geographic proportions are closely similar.

The transformation primarily indicates the hegemony of the primate city. On a chorographic base, the Chinese appear to be an insignificant proportion of the population, whereas by contrast their real economic importance is suggested by the demographic cartogram. The concentration in Bangkok and in the tin mines of the South is noteworthy.

EXAMPLE 3

The major population agglomeration in the state of Michigan (Fig. 10-4) lies in Wayne County which comprises most of Detroit. While efforts were made to retain the outer shape of the state, this map serves as an example of the severe distortions necessary to preserve contiguity between units of collapse stretching around units of great expansion.

The map is an excellent illustration of the rationale behind the Supreme Court "one man – one vote" reapportionment decision which negated territorial representation and its effect, namely, rural control of urban states. Territorially, Nixon dominates the state; demographically, Humphrey does. Other teaching points

include Lake County, the isolated Lower Peninsula county supporting Humphrey, which is a rare instance of northern black rural settlement. Also supporting Humphrey is the depressed region of cut-over forest and exploited iron mines in the western Upper Peninsula.

EXAMPLE 4

The map of the Detroit Standard Metropolitan Statistical Area (Fig. 10-5) was constructed using the 812 tracts of the 1960 census, starting with the downtown agglomeration. Building criteria included the preservation of the river line and county boundaries. Those census tracts falling into the same income and county boundaries. Those census tracts falling into the same income interval were then aggregated.

The transformations of size indicate differential residential densities associated with various income levels. The poor live crowded near the core and the wealthier live in the more expansive suburbs. The map again centers attention on the actual numbers of people who are involved in, for example, poverty, whereas the usual territorial (chorographic) representation does not facilitate the conceptualization of the size or importance of population phenomena. Von Thunen-type concentric rings are visible, showing a secondary node (Pontiac) with a pattern of sector development. When areal and demographic realities are compared, the inner urban low-income rings of the SMSA expand dramatically, and the outer rural low-income ring contracts reciprocally. Implications can be drawn for housing needs, medical or educational services, and the economic plight of today's city with its withdrawing tax base.

EXAMPLES OF VERTICAL MODELS

EXAMPLE 1

The model of Michigan population in 1900 and 1960 (Fig. 10-6) illustrates a basic problem of vertical construction. Comparability requires a uniform base area, but great population differences between units require different base areas for stability of construction. The solution employed in this model was to keep the base of each county the same for both time periods so as to facilitate comparison, but to allow variation among counties to reflect volumetric differences. Another solution might be to use a separate set of blocks for vertical models, the blocks cut in different volumes for ease of construction. While Detroit was

represented by a single block of wood due to difficulties of construction, general application of the set of building blocks used for the flat models demonstrates their versatility.

The 1900 model shows a generally dispersed population with some indication of central place development, whereas the 1960 model indicates more the function of distance decay from Detroit and the rapid industrialization and urbanization in the south. The dynamic processes of American population movement in the twentieth century – great overall growth with differential rates reflected in centralization, migration, and urbanization – are well illustrated. Explanations of the various counties of stagnation, decline, or growth can be sought in class discussion of such economic developments as the decline in copper and iron mining and the advent of new basic industries such as the location of the chemical industry in the Bay area.

EXAMPLE 2

The model of an age structure transect (Fig. 10-7) illustrates the use of divided vertical columns to reflect various population characteristics. It was desired to show the age structure of the population in terms of dependency relationships, and the columns were consequently divided into three levels depicting (1) population under eighteen, (2) the economically productive age-group, and (3) the population sixty-five and over. Other possibilities for structured vertical models include ethnic composition, sex ratios, income levels, political registration, or any other characteristic of the population. In this example the problem of large variation in population size is critical, as the proportional difference in age categories is not visually effective. The eighteen counties of the transect were chosen as a case-study approach to illustrate advanced development of a trend. In the north the median age is thirty-eight, while in the south it is twenty-three. This reflects rural out-migration and the attraction of the urbanized and industrial south. Implications of the dependency ratio for social services and political patterns would be fruitful subjects for discussion. This particular model has limited utility because of the large volumetric differences, but the idea remains viable for other topical divisions and awaits further elaboration of technique in reducing subject matter to comparable base levels.

CONCLUSION

While class projects contribute to many aspects of learning, such as social cooperation, organization and planning, conceptual

content, and learning reinforcement by achievement of project goals, the tactile and visual nature of models make them especially adaptive to processes of organic learning. The sequential steps of problem definition, data gathering, detailed planning, coordinated construction, exposition, and discussion all pursued within a framework of team-work provide a broad, total learning experience. Because of the explanatory power, implications, and importance of demography for many of today's most critical situations and dynamic processes, population models seem especially appropriate for classroom use in the social sciences. Certainly the areal representation of people instead of territory will provide a new perceptual framework for many students. The idea of population models and transformations may be adapted to a variety of uses, and the authors would appreciate hearing of any related projects or innovations found useful in classroom teaching.

11

The Uniform Crime Reports of the FBI

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What is crime? Each society has its own set of rules – the law – and violation of these constitutes crime. These rules vary from culture to culture (as youthful American drug offenders have found to their dismay in some countries), and may also vary considerably within cultures or nations. Precise definitions of crime (if not broad classes), are quite different from state to state within the United States. It cannot be doubted that attitudes toward crime vary greatly from one place to another since the punishment response pattern is so disparate. Michigan, for example, executed no one between 1930 and 1967, while in the same period 366 persons were executed in Georgia.

The behavior that constitutes crimes changes temporally as laws are adjusted to correspond to societal attitudes. Approval of abortion and reduction of highway speed limits are but two of many examples of the legitimization and illegitimization of behavior. Similarly, new activities may become crimes as a result of changing technology; or they may not be considered crimes because of changing attitudes. Thus bugging is a new technological crime, while streaking, a new variation on the theme of indecent exposure, is socially acceptable because it is indulged in by middle-class students who really know better, while indecent exposure is the preserve of "dirty old men" who must be punished. The law may be unambiguous in its definitions of crime, but society chooses to overlay emphasis and interpretation, which may mean that some laws are "dead letters" while others are enforced with extraordinary zeal.

HOW CRIME IS MEASURED IN THE UNITED STATES

How is crime measured in the United States? The facetious answer to this question is "poorly", as official crime rates are expressed in rates per 100,000 people. This is reasonably satisfactory when the units at risk are people. However, it is much less satisfactory with respect to property crime, which may or may not correlate strongly with the number of people in a given area. It has been argued, therefore, that property crime rates should be expressed in terms of units of property available. Even violence rates may be expressed more clearly in relation to population subgroups. Rape, for example, might be expressed relative to the number of females rather than to the whole population, since relatively few males are raped, except in prisons.

The other serious problem with our crime statistics is their incompleteness, or the problem of *under-reporting*. The question is not that crime is seriously under-reported, but to what extent? The situation is confused in that some crimes are reported less than others. Homicide is reported rather fully. Rape and larceny are not, for there are very large discrepancies between officially reported rates and actual rates (probably on the order of several hundred percent). Some clues on the dimensions of the discrepancy have been revealed by comparing police data with survey data.[1] Complicating the situation further are reporting discrepancies between socio-economic classes, as well as between crimes. The poor tend to report less than the rich. In considering crime in a particular geographic area, we should think about the type of crime and the kind of people involved in order to assess the accuracy of crime data. It may be noted parenthetically that some authorities present a convincing argument when they say that much of the meteoric rise in crime rates in the United States in recent years is the result of "dipping into the dark figure of unreported crime" rather than any real change in social behavior.[2] The balance might be accounted for in terms of population age structure changes, or increased crime opportunities, but not necessarily by declining moral standards.

THE UNIFORM CRIME REPORTS

The public agency charged with the responsibility of compiling

[1] *The Challenge of Crime in a Free Society* (New York: Avon Books, 1968), p. 98.

[2] Albert J. Reiss, Jr., "Assessing the Current Crime Wave," in Barbara N. McLennan (Ed.), *Crime in Urban Society* (New York: Dunellen Publishing Company, 1970), p. 41.

and publishing crime statistics is the Federal Bureau of Investigation, a branch of the U.S. Department of Justice. Data are published annually in a volume entitled *Crime in the United States* and subtitled *Uniform Crime Reports* (UCR). Publication usually occurs in August of each year. Thus in August of 1975, data for 1974 will be released. It should be emphasized that the UCR is not a census document, as are the products of census agencies who report according to law. In fact, the readers of this essay are legally obliged to tell the Census Bureau certain details of their personal background and living conditions every decade, but law enforcement agencies are under no such obligation to inform the FBI about crime in their jurisdictions. One can say hyperbolically that the federal government is apparently more concerned about the number of flush toilets we have in our homes than accurate compilation of crime data.

But are significant statistics omitted as a result of the voluntary nature of the UCR's compilation system? The most recent edition of the UCR at the time of this writing (released in August, 1973, covering the year 1972), omits on page 92 data for the Texarkana Standard Metropolitan Statistical Area (SMSA) located on the Texas and Arkansas border.[3] In a letter of explanation from the FBI, it was explained,

> . . . the Texarkana SMSA was omitted from the SMSA list because a significant portion of the SMSA did not contribute data to Uniform Crime Reporting. Other SMSAs which had incomplete reporting were also deleted from the list.
>
> Even though the deficient SMSAs were omitted from the individual list, they were estimated and are included in Table 1, page 61, of Crime in the United States – 1972. . .[4]

Texarkana historically has had *the* highest or one of the highest homicide rates in the nation. The easiest way for Texarkana to suppress this undesirable information is by not reporting it. Such a lack of statistical integrity is inimical to the existence of the kind of high-quality crime statistics that an advanced nation, apparently greatly concerned with crime, should demand.

It is most unfortunate that such an unsatisfactory situation should continue to exist more than four decades after the establishment of the Uniform Crime Reporting Program in 1930. The foreword to the UCR says

> . . approximately 10,000 law enforcement agencies, covering 93 percent of the United States population, submit monthly and annual

[3] FBI, *Uniform Crime Reports for the United States, 1972* (Washington, D.C.: Government Printing Office, 1973).

[4] Personal letter from the Director of the FBI, January 28, 1974.

> reports to the FBI so that information can be assembled to depict the current crime problem in the United States. National crime information would not be available ... without the voluntary participation of law enforcement agencies.[5]

The missing 7 percent, which may sound trivial, means over 14 million people are not served by crime data! One inescapable conclusion is that voluntary crime reporting is inadequate. The UCR may be serving the FBI and may be satisfactory to less professionalized elements of the criminal justice system, but teachers, researchers, and the public in general are forced to accept an inferior product. Another conclusion emerging without much persuasion is that it would be appropriate to remove the tasks of collecting and publishing crime data from the FBI, which has continually failed to show an aptitude in these areas. The responsibility should be handed over to the Census Bureau. The latter is not perfect, but chances are it would be more objective and would demonstrate more expertise in its techniques than the FBI. There is some evidence of change in this direction with the increasing use of crime victimization surveys, including a recent one called the National Crime Panel. It is administered by the Census Bureau.

Until more refined instruments are developed we must make do with the UCR. Figure 11-1 shows graphically how the data are assembled, compiled, and distributed. It should be emphasized that the statistics mainly present *reported* crime; offenses cleared by arrest and other arrest data are not provided with the geographic detail that relates to reported crime. Table 11-1 shows the subject matter of the 1972 UCR, and it can be seen that about 33 percent of the contents consists of crime rate or frequency data for geographic areas. About 21 percent is law enforcement employee data, again with some geographic detail. However, some 45 percent of the UCR statistical material does not provide any specific geographic detail and is useful to teachers of geography only as background reference material. Some of this is of dubious value. Former Attorney General Ramsey Clark has suggested that the "crime clocks," showing most recently that a murder occurs every twenty-eight minutes, "take the public for a fool."[6] He wrote, "The clock alarms but it does not tell the time."[7] The clocks, and the graphs which always seem to show phenomenal increases in crime, represent a view of crime unhindered by discus-

[5] FBI, op. cit., footnote 3, p. iv.

[6] FBI, op. cit., footnote 3, p. 30.

[7] Ramsey Clark, *Crime in America* (New York: Pocket Books, 1971), p. 29.

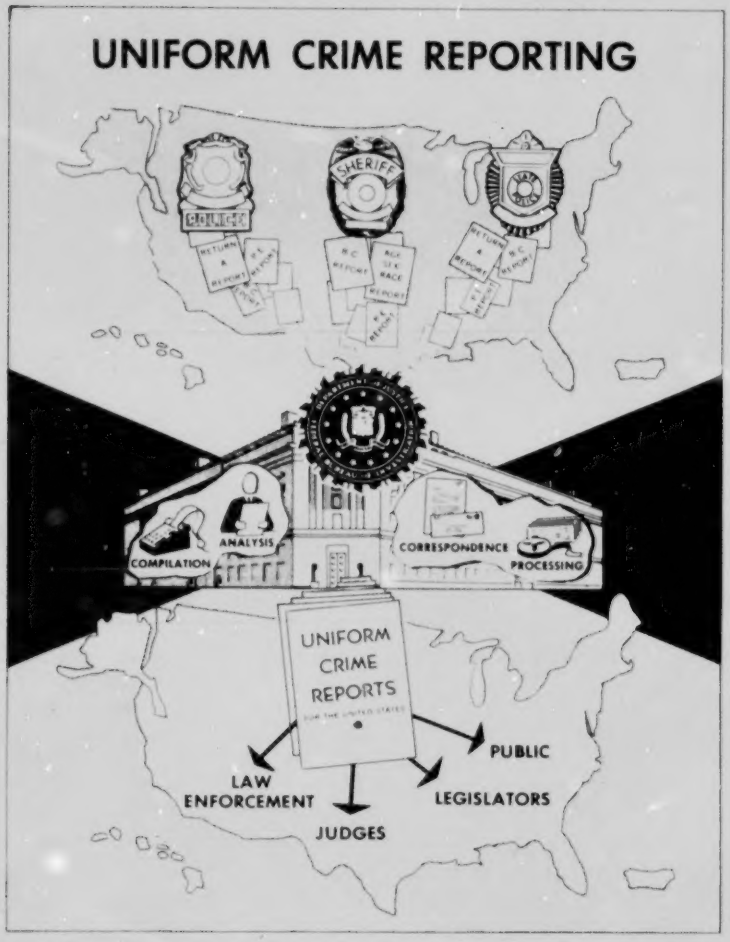


Figure 11-1. The collection, processing, and dissemination of crime data by the FBI. SOURCE: FBI, *Uniform Crime Reporting Handbook* (Washington, D.C.: Government Printing Office, 1966), p. iv.

TABLE 11-1
CONTENTS OF THE 1972 UCR

Subject Matter	*Percentage of Pages**
Definitions and trends of crime rates	22
Geographically classified crime rates, U.S., states, SMSAs	13
General statistics (no geographic detail)	8
Arrest statistics (no geographic detail)	15
Employee data (regional, state, city, and some county detail)	21
Index crime frequencies, cities 10,000 and above, selected universities, and suburban and rural counties	20

*Does not total 100 due to rounding and blank pages.

Source: U.S. Federal Bureau of Investigation, *Uniform Crime Reports for the United States, 1972* (Washington, D.C.: Government Printing Office, 1973).

sion or adequate explanation, and any teacher utilizing this material should consider the various caveats mentioned here and elsewhere.[8]

HOW THE UCR CAN BE USED BY TEACHERS

THE USEFULNESS OF SPECIFIC TABULATIONS

The UCR does provide some data that may be used with caution in comparing the crime rates (per 100,000 population) of states and metropolitan areas. Statistics take the form shown in Table 11-2. State data differ from Table 2 only in that the states are divided into SMSAs, "other cities," and "rural." The population and crime category headings are identical, however. The SMSAs are counties or combinations of counties with at least 50,000 people, and the total number in the UCR varies from year to year with the number reporting at acceptably complete levels. In 1972 there were data for 227 of the 243 SMSAs.

[8] See, for example: *The Challenge of Crime in a Free Society*, op. cit., footnote 1, pp. 96-100; Ronald H. Beattie, "A State Bureau of Criminal Statistics," in Marvin E. Wolfgang (Ed.), *Crime and Culture* (New York: John Wiley, 1968), pp. 169-186. See pp. 173-175 dealing with "Limitations of Present Criminal Statistics." Other significant discussions include: Simon Dinitz and Walter C. Reckless, *Critical Issues in the Study of Crime* (Boston: Little, Brown and Company, 1968), Chapter 3, pp. 61-96; and Anthony L. Guenther (Ed.), *Criminal Behavior and Social Systems* (Chicago:-Rand McNally Company, 1971), Part II (Some Issues in Measurement I: Criminal Statistics), and Part III (Some Issues in Measurement II: Techniques and Ethics), pp. 49-166.

TABLE 11-2
SAMPLE TABULATIONS FROM THE 1972 UCR

SMSA	*Population*	*Total Crime Index*	*Violent Crime*	*Property Crime*	*Murder & Non-Negligent Manslaughter*	*Forcible Rape*	*Robbery*	*Aggravated Assault*	*Burglary*	*Larceny $50 & Over*	*Auto Theft*
MODESTO, CAL. (Incl. Stanislaus Co.)	207,000										
Area Actually Reporting	100%	8073	782	7291	8	71	243	460	3561	2971	759
Rate/100,000 Inhabitants		3905.0	378.3	3526.8	3.9	34.3	117.5	222.5	1722.5	1437.1	367.1
MONROE, LA. (Incl. Quachita Parish)	118,000										
Area Actually Reporting	100%	1722	397	1325	13	17	44	323	600	551	174
Rate/100,000 Inhabitants		1455.7	335.6	1120.1	11.0	14.4	37.2	273.0	507.2	465.8	147.1
MUNCIE, IND. (Incl. Delaware Co.)	132,000										
Area Actually Reporting	100%	3118	305	2813	9	27	83	186	1281	1298	234
Rate/100,000 Inhabitants		2367.9	231.6	2136.3	6.8	20.5	63.0	141.3	972.8	985.7	177.7

Source: U.S. Federal Bureau of Investigation, *Uniform Crime Reports for the United States*, (Washington, D.C.: Government Printing Office, 1973), Table 5, p. 87.

The typical format displays, in addition to the SMSA population, three summary indexes – Total, Violent, and Property crimes. The next seven columns are the crime types referred to as "Index" (or Part I) crimes – those regarded as frequent and serious enough to be indicators of "the crime problem" in an area. It is interesting to note, apart from the burglary itself, that crimes of the Watergate *genre* do not count. Also, some readers may find it difficult to understand why the theft of a $51 bicycle would be regarded as an Index crime, while income tax evasion to the tune of half a million dollars is not. The answer is in frequency of occurrence and probability of reporting. Very large tax evasions are comparatively infrequent. Furthermore, the crime is inconspicuous and does not engender public reporting.

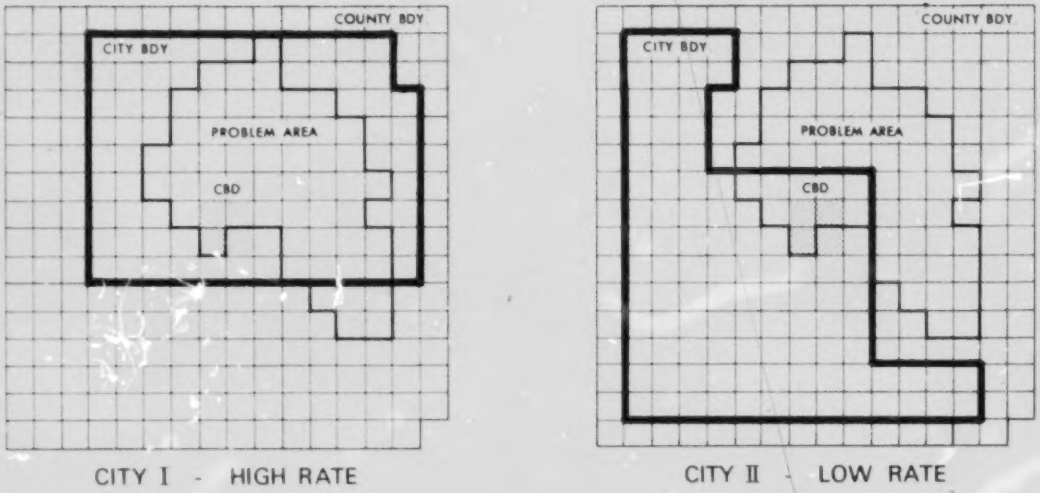
While crime *rate* data are available for states and SMSAs, city crime data are tabulated in *frequencies*, thus forcing the teacher into the tedious chore of converting the frequencies to rates. This task is complicated by the fact that city populations are not tabulated in the same manner as for SMSAs. City data are often quite misleading anyway, since a crime rate in a particular city may depend heavily on the way its boundaries are drawn.

THE SIGNIFICANCE OF BOUNDARIES

Figure 11-2 shows two hypothetical cities with boundaries superimposed on counties with identical crime rates. Assume that population density is identical in all cells, but that there are two violent crime rates, one high, the other low. The high rate is found in a central city problem area, while the low rate prevails in the middle-class suburbs. The violence rate difference between the two cities can be explained solely through a shift of boundaries. In the CITY I case, the city boundary includes almost all the problem area; of 107 city cells, fifty are occupied by the problem area. We will assume a population of 5,000 per cell in order to provide a base for calculating population-specific violence rates. There are the equivalent of two homicides per cell in the problem area, and one homicide for each two cells outside it. Thus CITY I has a total of 100 + 28 = 128 murders among 506,000 people for a rate of 25.3 per 100,000.

CITY II, on the other hand, overlaps the problem area only to the extent of ten cells. Using the same numerical basis of calculation, CITY II will have 20 + 48 = 68 murders (60 less than City I), for a rate of 13.4 per 100,000. In the county, however, the number of murders will be the same in both cases; 110 for the problem area (55 x 2) plus 100 for the balance of the county (200

CITY BOUNDARIES AND CRIME RATES



- OVERALL RATE FOR COUNTY SAME IN BOTH CASES
- CITY CRIME RATE HEAVILY DEPENDENT ON HOW BOUNDARIES ARE DRAWN
- CITY IS AN INAPPROPRIATE UNIT OF MEASUREMENT FOR CRIME RATES

Figure 11-2. The impact of boundaries on the crime rate of two hypothetical cities.

÷ 2) equals a total of 210, yielding a population-specific rate of 16.5 per 100,000.

Nothing has changed from one map to the next except one artificial construct – the location of the city boundary. According to official statistics, however, CITY I will have a murder rate of 25.3, but in placid CITY II, the rate is only 53 percent as much, or 13.4

One can readily see that the city is quite an *inappropriate* unit of measurement for homicide rates, or any other crime rates for that matter. The county is also imperfect, but it is likely to yield a better generalization than statistics based on the corporate limits.

What happens when county- and city-based murder rates are compared using recent data for actual communities? Table 11-3 provides some examples. The Metropolitan Rate refers to multi-

TABLE 11-3
COMPARISON OF METROPOLITAN VERSUS CITY BASED HOMICIDE RATES, 1972
(Rates are per 100,000 persons)

COMMUNITIES	*HOMICIDE RATES*	
Ranked by 1970 SMSA Population	*Metropolitan*	*City*
1. New York, N.Y.	19.1	21.4
2. Los Angeles, Calif.	12.8	17.8
3. Chicago, Ill.	11.5	21.1
4. Philadelphia, Pa.	10.7	21.2
5. Detroit, Mich.	17.3	39.8
6. San Francisco, Calif.	8.6	11.3
7. Washington, D.C.	12.4	32.4
8. Boston, Mass.	4.6	16.2
9. Pittsburgh, Pa.	3.9	9.4
10. St. Louis, Mo.	12.7	33.0
11. Baltimore, Md.	17.6	36.4
12. Cleveland, Ohio	16.1	40.9
13. Houston, Tex.	17.3	23.9
14. Newark, N.J.	10.7	38.7
15. Minneapolis, Minn.	3.8	9.0
16. Dallas, Tex.	14.0	22.7
17. Seattle, Wash.	4.5	7.9
18. Anaheim, Calif.	4.7	8.4
19. Milwaukee, Wisc.	4.3	7.8
20. Atlanta, Ga.	23.0	51.3

Sources: Homicide Rates: U.S. Federal Bureau of Investigation, *Uniform Crime Reports for the United States, 1972* (Washington, D.C. Government Printing Office 1973), Table 76, pp. 218-219. Populations: U.S. Bureau of the Census, *Metropolitan Area Statistics* (Washington, D.C.: Government Printing Office, 1971).

county SMSAs, and the City Rate relates to the (usually) smaller area encompassed by the incorporated city limits.

Apart from the extraordinary range of homicide rates for either SMSAs or cities, it can be seen without exception that city rates are higher than SMSA rates – over twice as high in Detroit, Washington, D.C., Boston, Pittsburgh, St. Louis, Baltimore, Cleveland, Newark, Minneapolis, and Atlanta. This results from the dilution of the high crime center by the low crime suburbs, and further exemplifies the significance of boundaries in crime measurement and comparison processes. In general, then, the teacher is well-advised to use SMSA data in the development of student activities. However, if a teacher wishes to use other data, it would be appropriate to do so as long as the limitations are kept in mind. Crime data may be weak, but they do at least enable rather clear demonstration of how an attempt to measure human behavior may yield radically different results depending on the geographic scale utilized.

INTRAURBAN CRIME DATA

The teacher seeking data for census tracts or other intraurban areas should consult local law enforcement agencies; the UCR do not contain such information. In general, the quality and availability of crime statistics will diminish with the size of communities. Large, highly professionalized police departments publish annual reports detailing the distribution of offenses by patrol areas. Smaller departments often lack the personnel or motivation to produce data for public consumption, and teachers in such communities are at a disadvantage. One graduate student working with the author on a problem concerning the local geography of crime was threatened with "investigation" by the local police department when he requested crime data for the city. This kind of reaction is unlikely in a professionalized department, and is, one hopes, atypical.

CRIME DATA NEEDS

From the teacher's perspective, the maxim that might be applied to crime data is "bigger and better." Data are needed for more areas, measured by more sophisticated rates, and cross-tabulated with socio-economic population information. Although the National Crime Survey, so far conducted only in Law Enforcement Assistance Administration "Impact" cities, is a step in the right direction, the information released will be of a general nature

and will still not provide intraurban detail. The basic questionnaire contains about fifty items, and the crime incident report another twenty; however, information of a geographic nature is lacking, presumably in part because of the confidentiality constraint of census documents. In the long run teachers will only get the data they need by requesting it aggressively and repeatedly.

PREVIOUS STUDIES USING THE UCR AND THEIR RELATION TO CLASSROOM ACTIVITIES

Few studies have used UCR for purposes of geographic comparison or other analysis. This dearth of publications relates in part to the unreliability of the UCR, but also to the lack of interest in the study of crime on the part of geographers. Studies have been conducted recently comparing states and metropolitan areas, however, and these have been synthesized and put in the context of other work in a recent book, entitled *The Geography of Crime and Justice.*[9]

Some of the approaches used in the studies cited would be feasible in the classroom. For example, students may:

1. Rank-order states or SMSAs by crime rates and seek explanations of differences.
2. Map state or SMSA rates to provide a basis for discussion of regions that may emerge.
3. Attempt a simple classification of SMSAs on the basis of crime characteristics.
4. Develop the students' own measures of crime, using opportunity-based rates rather than simple population totals.
5. Discuss the adequacy of the UCR and the relationship of media treatment of crime to the deficiencies of the UCR.
6. Develop planning strategies to inhibit crime, using student research as the basis for decision-making.

[9] Keith D. Harries, *The Geography of Crime and Justice* (New York: McGraw-Hill, 1974).

12

Investigating the Geography of Crime

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Crime news is prominent in every newspaper and on every television and radio news report, and has become one of the most serious and controversial challenges confronting our society today. The importance of crime as an issue has led most people to have definite opinions, be they true or false, about where crime occurs in the nation and in their own local area. Popular books, such as *Safe Places*, by David and Holly Franke, have exploited the public's desire to find some place to escape crime. The Frankes suggest a solution that agrees with much common opinion – that the places to go are small, out of the way towns, such as Monticello, Utah, or Georgetown, Kentucky. A comparison of what students find in the three projects suggested here and their own preconceptions is bound to produce lively discussion.

Each of the three projects outlined here treats a different fact of the crime problem, and helps to build various differing aspects of the student's abilities. Project 1 investigates murder rates, by state, within the United States. It is designed to give the student an understanding of the sectional patterns in murder rates, and practical skills in regionalizing patterns and in understanding the limitations of data for heterogeneous areas such as states. Project 2 investigates patterns of a particular crime, street robbery, within Minneapolis, Minnesota. It is intended to give students greater ability in producing and interpreting dot maps, to relate such maps to familiar surroundings, and to draw conclusions from them. Project 3 asks the students to graph the relationship between metropolitan area population and auto theft rates. This exercise develops skills in the construction and interpretation of graphs, and the ability to generalize about relationships as well as to isolate and interpret exceptions to general relationships.

PROJECT 1: MAPPING AND REGIONALIZING MURDER RATES IN THE UNITED STATES

DATA SOURCE

Data for this exercise are obtained from the Federal Bureau of Investigation's *Uniform Crime Reports.* The example given here utilizes murder rates by state for the year 1970, though many other projects could be drawn from the same source. The *Uniform Crime Reports* have been published by the FBI since 1930, and are issued annually. Most of the data published in the *Reports,* especially for areas in the nation as a whole, are for seven "index crimes." These index crimes are murder and non-negligent manslaughter, forcible rape, robbery, aggravated assault, burglary, larceny of goods valued at $50 and over, and auto theft. Data for these crimes are available by states, standard metropolitan statistical areas, and for municipalities of over 25,000. Some additional data are available on the age, race, and sex of apprehended criminals, and on police department employment.

The teacher must be very cautious when using the *Uniform Crime Reports,* or any crime data. He must be aware of the exact definitions of the crimes involved, which are contained in the summary section of the *Reports.* Even more important, the teacher must realize and emphasize to his class that the reports are based on data from local police departments, and which are often highly inaccurate. A recent survey by the Census Bureau showed that only one-half of all crimes were reported in the five largest American cities, and that in Philadelphia, for example, only one in five crimes was included in official reports. About 9 percent of the U.S. population, including 29 percent of the rural population, was not in the reporting area for the *Uniform Crime Reports* in 1970. In some states this is a serious problem; 77 percent of rural Tennessee was *not* in the reporting area in 1970. Some crimes are better reported than others. Murder, chosen for this project, is generally considered to be the best reported of the index crimes. Interestingly, it also shows the clearest geographic pattern. Rape is particularly poorly reported, and should be avoided in cartographic analysis. A more detailed discussion of the *Uniform Crime Reports* is found in the preceeding essay by Professor Harries.

OBJECTIVES

After completing this project, the students should be better able to:

1. Construct choropleth maps, given the basic data. The actual

construction of such a map, and the problems associated with choosing data intervals, should give the students better ability to interpret patterns found on choropleth maps in textbooks or on wall maps. Devising data intervals will also help the student appreciate the arbitrary nature of these divisions and not give undue significance to them.

2. Better appreciate what the region is, and the art and science of regional delimitation, following their experience in dividing the nation into regions based on murder rates. Class discussion should make the students more aware of the problems involved in defining regions where gradients of change exist, and in relating regions defined by one variable to other regions.
3. Develop, through in-class discussion, an awareness of the problems of using imperfect data to define regions. Class discussion should make students aware of the problems in crime reporting, and in using a single rate to describe heterogeneous regions, such as states, which include central cities, suburban and rural areas.
4. Compare preconceptions of where murder rates *should* be highest, based on "common knowledge," with where they actually *are* highest. Most students are surprised to discover that the highest rates are in the South, which is the least metropolitan section of the nation, and that some highly metropolitan states, such as Massachusetts, have low murder rates.

PROCEDURE

The following steps should be performed in this project:

1. Students should rank the states from low to high, based on murder rates as given in the *Uniform Crime Reports*, and divide the states into quintiles of ten each. (The teacher may also ask students to look for "natural breaks" to define data categories.)
2. States should be colored or shaded based on crime rates. A useful simple scheme of shading is as follows:
   1st (lowest) quintile – blank
   2nd quintile – dots
   3rd quintile – lines
   4th quintile – cross lines
   5th (highest) quintile – solid
3. Students should be asked to write a short description of the geographical patterns which emerge. Which sections of the country have the highest rates, which have the lowest? Are

gradients of change from highest rate areas to lowest rate areas present?

DISCUSSION HINTS

Discussion of the student's regionalization of murder rates, and problems encountered in making these regionalizations, will greatly increase the value of this exercise as a learning experience. Students should compare their descriptions of regional patterns with others in the class to see how similar or how different they are. The group of eight contiguous states in the south that are all in the highest quintile should lead all students to describe the south as the highest murder-rate region of the nation. Low rates are more scattered, the lowest being found in New England and the Upper Midwest. This may give students more difficulty in generalization. Problems of using state-level data which include urban, suburban, and rural areas, as well as problems of inaccurate data, should be included in class discussion.

The most interesting aspect of the discussion is likely to be a comparison of murder rates with the student's expectations. Most students expect the most urbanized states to have the highest murder rates. The highest rates, however, are in the south, which is the least urbanized region of the nation. (Fig. 12-1). Causes of high murder rates in the south cannot be definitely specified, though some interesting correlates have been suggested, including high levels of firearm ownership and the distinctive cultural mores of this region. Both blacks and whites in the south have abnormally high murder rates, and almost all murders are intra-racial, tending to rule out racial antagonism or a large black population as a major factor.

PROJECT 2: MAPPING AND INTERPRETING AN INTRAURBAN CRIME PATTERN

DATA SOURCE

Those parts of the city having the most crimes, and thus constituting what has been called the "criminal area," have been a subject of interest to police and criminologists for decades. As a result of this long-term interest, many cities collect crime data for sub-areas – police precincts, census tracts, or *ad hoc* areas developed specifically by police departments. The census tract is probably the ideal area for data collection because crime incidence can be compared to census data on social characteristics. However,

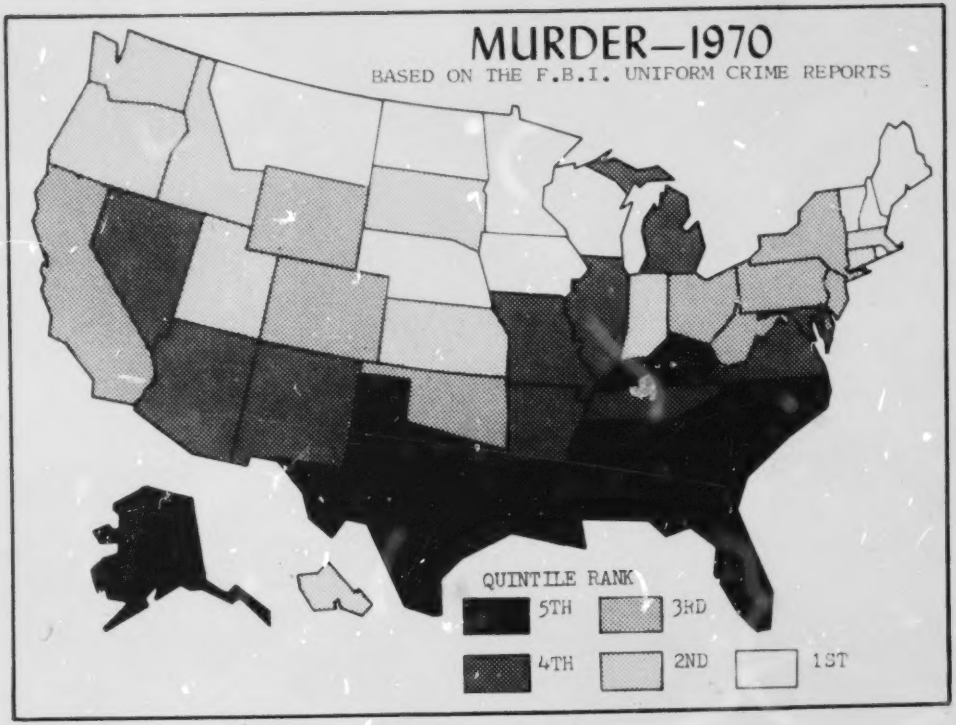

Figure 12.1. Murder–1970

the census tract has not been widely used until recently. Even in cases where the census tract or some other small area is used for internal data purposes, police departments often refuse to release the information to the public. It is, however, worth the teacher's time and effort to attempt collection of local area data for a specific city. Mapping data in the students' home area allows them to compare the patterns found with their own knowledge of the area, and thus obtain a better understanding of the patterns.[1] Data for this exercise were obtained from the Minneapolis Police Department. A much more comprehensive set of data for Minneapolis is found in *The Geography of Crime*, an unpublished Ph.D dissertation by the author of this paper, which is available from University Microfilms.

OBJECTIVES

After completing this exercise, the student should be better able to:

1. Construct dot maps, given basic data. As with the first project, this will improve student's abilities to interpret maps used in and out of the classroom. Problems encountered in the procedures of dot mapping, especially in the placement of dots, will help the student to appreciate the approximate nature of dot placement on all dot maps.
2. Compare patterns of crime within the city to other social and physical patterns. Cities large enough to have census tracts allow comparison of crime data to socio-economic data from the census.
3. Relate crime and opportunity patterns. Though most crime rates are stated on the basis of residential population, this is not a good measure for many crimes (including street robbery). A crime rate should compare the number of crimes that did occur to the possible number of targets that could have been victimized. In this exercise, the incidence of street robbery will be mapped. A true rate for this crime would compare the number of persons actually on the street to the number who were robbed. In many areas, such as the central business district, the number of persons on the street would be much larger than the census population of the area. Unfortunately, there is no good measure of the number of pedestrians on streets on a city-wide basis.
4. Compare safe and dangerous areas with the student's precon-

[1] For example, published maps of crime incidence are available for Seattle, Washington, in *Crime in the State of Washington*, by Calvin Schmid.

ceptions. Although it may be difficult to compute precise rates for street robbery, various peak areas stand out clearly (Fig. 12-2). These can be compared to areas the students believe are high crime areas, based on "common knowledge." An interesting way to do this comparison is to ask the students to indicate the areas they believe will have high crime rates *before* they map the data.

PROCEDURE

In the example used here, rates of street robbery have been mapped by census tract for the city of Minneapolis, Minnesota, based on data obtained from the police department for the calendar year 1971. The mapping procedures given might easily be adapted to representing other crimes. Street robbery is defined, for the purposes of this data collection, as obtaining money or other items of value by force, or the threat of force, when the crime occurs outside of a residence, business establishment, or other building. Data were given as the total occurrence of the crime by census tract.

The following steps should be used in mapping this data.

1. Students must decide how many crimes each dot represents. If the number of crimes is extremely large (over about 1,000), each dot should include two or more crimes. With smaller numbers of crimes, each dot can represent one crime (Fig. 12-2).
2. Students must prepare a base map with the appropriate scale and base information. In the example given here, data were provided by census tract, and a base map showing census tract boundaries and the names of important streets had been prepared.
3. Students enter data on the map by placing dots within the proper data collection areas. With a large number of dots to place, as in this example, a group project might be formed. In some cases maps may be made more accurate by placing dots within the portions of the census tract or other data area where the crime *must* have occurred. Business robberies, for instance, can only happen in commercial portions of tracts. Comparison of the tract map with a zoning map allows more accurate placement of dots. Street robbery, on the other hand, can occur almost anywhere within a tract, so that the dots have been randomly scattered within tracts in the example. If available, press-on dots greatly speed the process of construction and produce a much better final map.
4. Students should write a short description of the spatial pattern

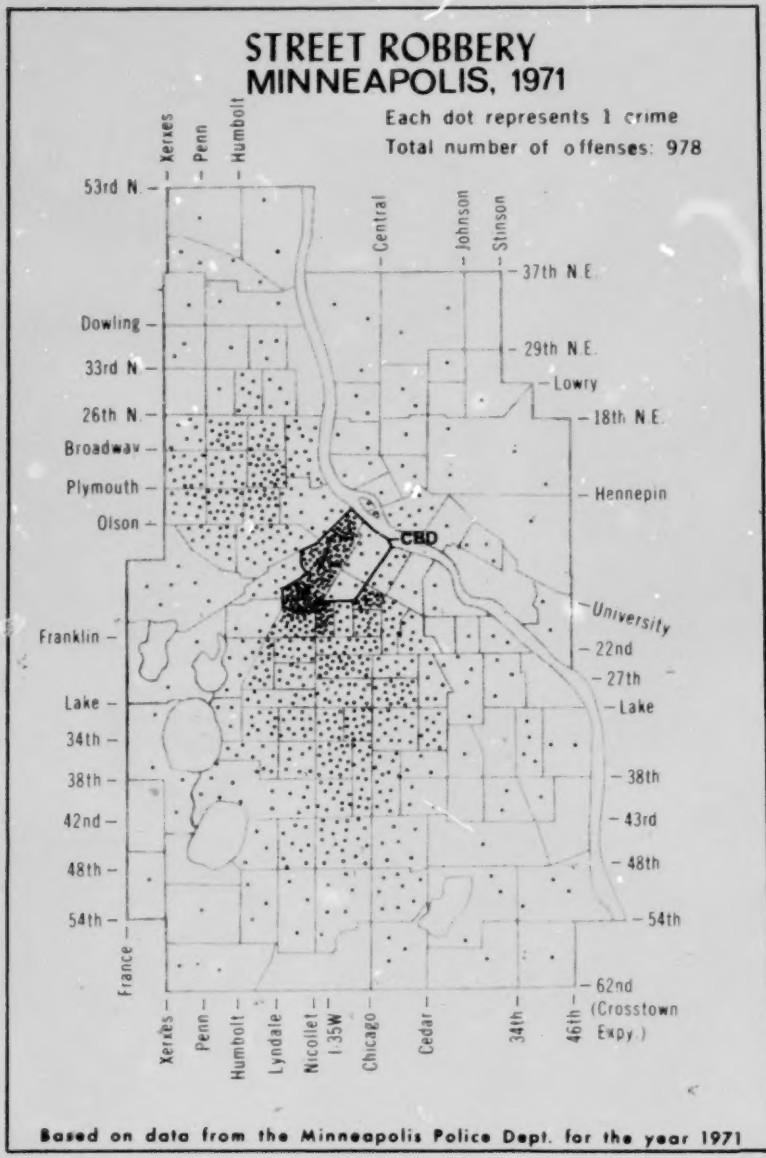

Figure 12-2. Street Robbery, Minneapolis, 1971

that they see on the dot map, and the ways in which it is related to the social and physical structure of the city. Do street robberies occur mainly in the central business district? In lower class residential areas? Many such questions are answered best by mapping the crime, in this case street robbery.

DISCUSSION HINTS

Comparison of students' descriptions and knowledge of the patterns found and their relationships to other physical and social aspects of the urban structure is bound to produce a more complete picture. The patterns found in Minneapolis reveal many anomalies which may be explained by perceptive students who consider both the motives of the criminal and the distribution of potential victims. A high incidence of street robbery is found in the lower-status neighborhoods of Minneapolis to the south and northwest of the central business district, undoubtedly being related to the residential locations of the criminals. The overwhelmingly dominant concentration, however, is within the central business district. Moreover, it is in the portion of the central business district where criminals and victims come into close proximity, where "skid row" and the entertainment district come into close proximity. Examination of a number of patterns of crime (though each is unique) shows that all crimes have a very definite distribution influenced by the distribution of potential targets. Despite the beliefs of criminologists and police, there is no single "criminal area" within a city.

PROJECT 3: GRAPHING THE RELATIONSHIP BETWEEN AUTO THEFT RATE AND CITY SIZE

DATA SOURCE

The data on crime rates by standard metropolitan statistical area (contained in the *Uniform Crime Reports)* provide the basis for many possible avenues of investigation of relationships between crime rates and the characteristics of cities. No relationship is thought to be more important than that between crime rate and city size. The general belief is that as city size increases, so does the overall crime rate. Correlation analysis reveals that statistically significant, but generally very low, correlations exist between metropolitan area population and rates of most of the FBI index crimes (Table 12-1).

TABLE 12-1
CORRELATION BETWEEN CRIME RATES
AND METROPOLITAN AREA POPULATION

Murder	+.26
Rape	+.33
Robbery	+.50
Aggravated Assault	+.10
Burglary	+.37
Larceny	+.23
Auto Theft	+.64

Note: All relationships except aggravated assault are significant at the .01 level.

Source: Based on data for 204 metropolitan areas from the 1971 *Uniform Crime Reports.*

OBJECTIVES

Auto theft has been chosen for this exercise because it shows the strongest relationship to population size. After completing the exercise, students should be better able to:

1. Graph data. The process of correctly graphing auto theft rates proves to be quite difficult for many students, even university juniors and seniors.
2. Interpret a graph. Before beginning this exercise, the teacher should discuss the notions of positive and negative relationships (and no relationships) and how they are revealed on graphs. Students will find that even when a strong relationship exists, points are still quite scattered (Fig. 12-3). Students should also be asked to look for cases in which the general relationship does not hold. Some small cities have very high auto theft rates, while some large cities have relatively low rates. Students should be able to spot these on the graph, and should attempt to explain *why* these cities do not conform to the general relationship.
3. Assess an hypothesis. Although calculation of the correlation coefficient is beyond most students' quantitative abilities and requires more time than would be reasonably available, students should be able to assess the reasonableness of the hypothesis that auto theft rates increase as city sizes increase.

PROCEDURE

1. Students must construct a graph with intervals suitable to the range of population and crime rates being studied. Metropolitan areas range from about 100,000 to 11 million popula-

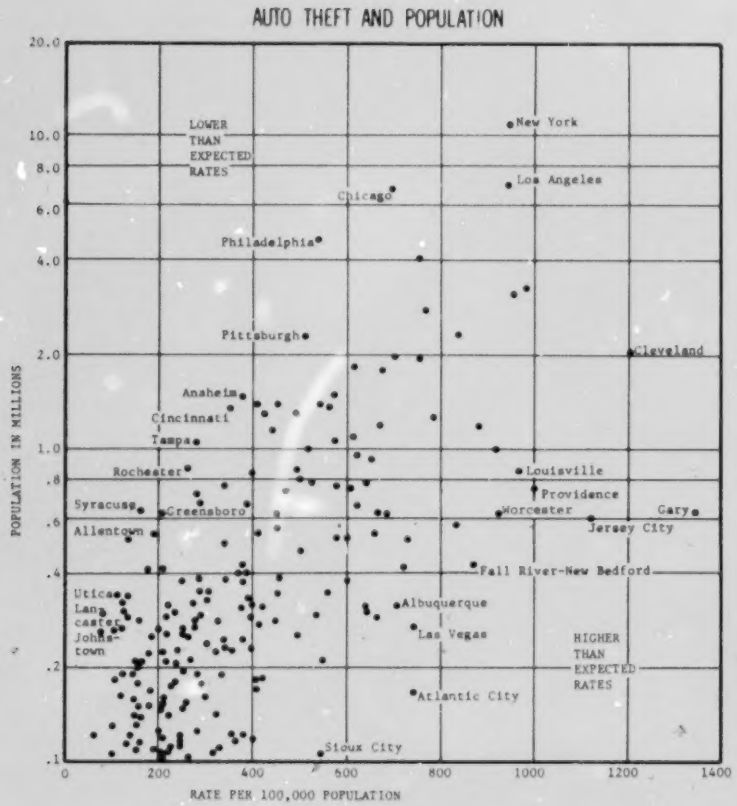

Figure 12-3. Auto Theft and Population

tion. This wide range of values necessitates graphing population logarithmically (Fig. 12-3).[2] Rates of auto theft in 1970 varied from about 60 to about 1350 per 100,000 population.

2. Population and auto theft rates for each of the metropolitan areas listed in the *Uniform Crime Reports* (204 areas in 1970) are plotted on the graph. It is advisable to have one student plot and another student check each point. Even upper-class university students make a surprising number of mistakes, either by transposing the population and theft rate values, or carelessly placing the points.

[2] It is suggested that interdepartmental cooperation with the mathematics department could facilitate this exercise.

3. Students should write a short description of the pattern of points. The descriptions should tell whether the pattern indicates a positive relationship between population size and high auto theft rates. If the student sees a positve relationship (which should be the case in this example), he should be asked to explain *why* the relationship exists, and why some cities, such as Gary, Indiana, deviate so much from the expected relationship. Are the deviant cities similar in terms of function, geographic location, or some other characteristic?

DISCUSSION HINTS

The auto theft rate, with a Pearson correlation coefficient of +.64 to population, is the index crime most closely related to city size. Yet students will not see a simple, straightforward and unmistakable positive relationship between the two, making this an interesting exercise for students studying correlation and its meaning. The correlation between these two variables is about as high as correlations between two "messy" social variables can be. Students will see several cities by looking closely at the data with anomalously high auto theft rates. Gary, Indiana, and Jersey City, New Jersey, show two of the highest rates, despite the fact that they are not among the nation's largest metropolitan areas. These two areas are, however, immediately adjacent to Chicago and New York. Atlantic City and Las Vegas also show high rates for their size, which may result because they are "sin and pleasure" capitals, attracting a large transient population. Low auto theft rates are found in several neighboring cities of Pennsylvania and upstate New York, such as Utica, Syracuse, Rochester, Lancaster, Johnstown, Allentown, and Philadelphia. The reasons for this regional concentration are unclear. Philadelphia, however, was found to have the highest degree of under-reporting of crime of the five largest American cities in a recent survey by the Census Bureau. Inefficiency or statistical dishonesty on the part of police departments may explain a number of the very low auto theft rate cities. Many anomalies, such as the high rate of auto theft in Sioux City, Iowa, have no obvious explanation, with the possible exception of well-organized local auto theft rings.

CONCLUSIONS

These three projects involve the development of a number of student skills, ranging from the relative simplicity of constructing a choropleth map to the more difficult interpretation of a semi-

logarithmic graph. Each of the exercises will also, hopefully, give the student a better understanding of the true nature of the geographic distribution of crime and the nature of the crime problem. In demonstrating the inaccuracy of some popular notions about crime, these exercises will also demonstrate the role which the geographer may play in understanding a complex social problem.

13

The Census of Housing

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Indicators available through the Census of Housing provide the best and most comprehensive view of American living that can be obtained. Data are not only available on types of housing, including structural characteristics, but also on mobility of the populace, tastes and preferences of families (in terms of housing appointments and gadgetry), availability of utilities, the nature of residential finance, race, house values, and education. The detailed nature of the information belies the fact that the Census of Housing is one of the newest of the major inventories undertaken by the Bureau of Census.

Unfortunately, in-depth housing data are obtainable for only the past three decades. Before 1940 few items were collected on housing by the Census Bureau. Partly for this reason, the *1940 Census of Population and Housing* has been described as the first contemporary census.[1] But in this short thirty-five year period an enormous wealth of data has accumulated on the housing stock in the nation. The tremendous expansion of the urban population, particularly in major metropolitan areas, paralleled the growing complexity of this inventory. In fact, detailed metropolitan housing data at the city block and census tract level comprise the major portion of the collected information. Emphasis in the Census of Housing has always been on gathering sub-area data in major metropolitan regions. Indeed, one goal of the original *1940 Census of Housing* was to determine the demand for public housing programs in light of the desperate status of housing for the city dweller in the wake of the depression of the 1930's.

[1] U.S. Bureau of the Census, *Population and Housing Inquiries in U.S. Decennial Censuses, 1790-1970*, Working Paper No. 39 (Washington, D.C.: Government Printing Office, 1973), p. 1.

Very few questions are asked from all households. In 1970, for example, only fifteen items were included on a complete-count basis. Notwithstanding this practice of using sampling procedures, initiated for the first time in 1950 along with computer processing of data, a wide array of data can be assembled at the household level. The sampling process has become very sophisticated and by 1970 included both a 15 and a 5 percent sample (20 percent where both were included). Self-enumeration has also increased. In 1970, 60 percent of the country was covered by mailed questionnaires, rather than by an enumerator as in earlier times.

HISTORY

The few indicators available on housing prior to 1940 were collected in conjunction with the Census of Population. Occupancy characteristics were most often collected, although no temporal standardization existed. In 1860, for example, a question asked for the number of slave houses, but this item was not gathered in later years. In 1890 the first distinction was made between farm and nonfarm housing. Owner occupied and rented status statistics also commenced at this time, and fortunately, continued appearing in later reports. The first data on year-round and seasonal occupance, and the status of vacant units (for sale, for rent) appeared in 1940. Few additional items have been added in the area of occupance in the last three censuses. One exception occurred in 1970, with the addition of information on second homes.

Housing structural characteristics received considerable attention in the landmark 1940 census (Table 13-1). Detailed information was collected on exterior construction materials, the purpose of the structure, its type (single-family, detached, and others), the number of rooms, year built, and the number of units in the structure. Data were available not only for rural areas but for major urban centers, at both the city block and tract levels. Structural characteristics categories have been expanded and refined in succeeding census reports. In 1950, for example, data collected on mobile homes commenced. In the 1960 and 1970 censuses, data were provided more precisely to permit identification of large multiple unit structures, in terms of number of stories, elevator availability, and other items. Statistics on basements have also been collected in the last two decennial reports, along with information concerning access to the unit.

The importance of structural data, and later, of plumbing facilities information, is that they provided knowledge about

TABLE 13-1
HOUSING CENSUS ITEMS

	1940	1950	1960	1970
Occupancy				
Farm or Nonfarm	X	X	X	X
Occupied or Vacant	X	X	X	X
Tenure (owned, rented)	X	X	X	X
Owned or Mortgaged	X	X	–	–
Seasonal or Year-round (for vacant units only)	X	X	X	X
Vacancy Status	X	X	X	X
Duration of Vacancy	–	–	X	X
Second Home	–	–	–	X
Structure				
Type of Structure (single, attached, etc.)	X	X	X	X
Number of Rooms	X	X	X	X
Number of Bedrooms	–	–	X	X
Year Built	X	X	X	X
Original Purpose of Building	X	–	–	–
Exterior Material	X	–	–	–
10 or more Units at Address	–	–	–	X
Number of Units in Structure	X	X	X	X
Mobile Home or Trailer	–	X	X	X
Mobile or Fixed	–	–	X	X
Basement	–	–	X	X
Number of Stories	–	–	–	X
Elevator (for structures of 4 stories and over)	–	–	X	X
Access to Unit	–	–	X	X
Condition and Plumbing				
Condition	X	X	X	–
Water Supply	X	X	X	X
Toilet Facilities	X	X	X	X
Bathing Facilities	X	X	X	X
No. Bathrooms	–	–	X	X
Source of Water	–	–	X	X
Sewage Disposal	–	–	X	X
Equipment and Fuels				
Lighting	X	X	–	–
Heating Equipment	X	X	X	X
Heating Fuel	X	X	X	X
Cooking Fuel	X	X	X	X
Water Heating Fuel	–	–	X	X
Refrigeration	X	X	–	–
Kitchen Sink	–	X	–	–

	1940	*1950*	*1960*	*1970*
Equipment and Fuels (Cont.)				
Kitchen, Cooking Facilities	–	–	X	X
Radio Sets	X	X	X	X
Clothes Washer	–	–	X	X
Clothes Dryer	–	–	X	X
Freezer	–	–	X	X
Telephone	–	–	X	X
Air Conditioning	–	–	X	X
Television	–	X	X	X
TV W/UHF	–	–	–	X
Dishwasher	–	–	–	X
Automobiles	–	–	X	X
Financial				
Value	X	X	X	X
Contract	X	X	X	X
Rent	X	X	X	X
Unfurnished Rent	X	X	–	–
Rent of Owned Nonfarm House (est.)	X	X	–	–
Gross Rent	X	X	X	X
Whether Mortgaged	X	–	–	–
Mortgage Balance	X	*	*	*
Mortgage Interest Rate	X	*	*	*
Mortgage Holder (type)	X	*	*	*
Mortgage Payment	X	*	*	*

*Supplemental question

Source: Modified after U.S. Bureau of the Census, *Population and Housing Inquiries in U.S. Decennial Censuses, 1790-1970,* Working Paper No. 39 (Washington, D.C.: Government Printing Office, 1973), pp. 34-36.

housing quality in the first three Censuses of Housing. Reflecting a less mechanized past, the first two housing censuses included plumbing data on only water supply and toilet and bathing facilities. The last two reports (1960 and 1970) added material on the number of bathrooms, source of water, and sewage disposal.

Regarding equipment and fuels, statistics on lighting, heating equipment, and fuel were also gathered in 1940. Many items in this area were added in 1960, including the availability of washer-dryers, freezers, telephones, and air conditioning. Television inventories commenced in 1950 and automobile availability in 1960. Dishwashers and television sets with UHF capability joined the list of enumerated items in 1970. In the meantime, data on several items were dropped in 1960 because either standard household equipment had improved or earlier provided information

served no real purpose (e.g., whether a rented home was furnished or unfurnished).

Information regarding residential finance has focused primarily on the mortgage status of properties, but rent and value items have also been consistently obtained since 1940. Whereas all finance items were an integral part of the 1940 census, more recent inventories of this data have been gathered separately, and in 1960 mortgage data came under the purview of the *Components of Inventory Change* special survey. This program is discussed later.

In summary, few items have been dropped from the Census of Housing since the first inventory in 1940. Major exceptions include the original purposes of a building, and data on exterior construction materials and condition. The 1940 and 1950 censuses were essentially identical in terms of the number of items gathered (Table 13-2). Considerable additional information was added in 1960 and continued in 1970, making the last two censuses far more comprehensive than the first two, but yet very similar to the earlier inventories (Table 13-3).

The number of supplementary census publications related to the Census of Housing has also become more complex. These additional data provide a time series in their own right, and include construction statistics, reports on the *Annual Housing Survey*, the *Components of Inventory Change*, and special profiles on low income areas. A detailed listing of the format and contents of Census of Housing documents is found for each census year since 1940 in "Census of Housing Publications, 1940-1970" at the end of this essay. In addition, special treatment is given in the text to the 1970 Census, because the data comprise the most current inventory available.

QUALITY OF HOUSING

The original backbone of the Census of Housing was descriptive data on housing structures and household and dwelling unit characteristics, including their facilities and maintenance. The latter information was used to determine housing quality.[2] More specifically, information on the "state of repairs" of dwelling units formed the basis of a two-fold classification on quality: "not needing major repairs" and "needing major repairs." A unit was classi-

[2] Material in this section is based on these documents: U.S. Bureau of the Census, *Measuring the Quality of Housing: An Appraisal of Census Statistics and Methods*, Working Paper No. 25 (Washington, D.C., 1967); and B. S. Wellar, and T. O. Graff, "Introduction and Selected Bibliography on the Quality of Housing and Its Environment," *Council of Planning Librarians, Exchange Bibliography #270* (Monticello, Illinois, March, 1972).

TABLE 13-2
COMPARISONS OF 1940 AND 1950 HOUSING CENSUSES

Descriptive and Financial Items	*Items Enumerated*		*1940 Tabulations*	
	1940	*1950*	*Blocks*	*Tracts*
Structure				
1. Count of structures	X	X	X	X
2. Structure type and size	X	X	–	X
3. Conversion from other type	X	–	–	–
4. Exterior materials	X	–	–	–
5. Year built	X	S*	X	X
6. Value of property (owner-occupied)	X	X	–	–
7. Mortgage status (owner-occupied)	X	X	X	X
Dwelling Unit				
8. Count of units	X	X	X	X
9. Size of units (number of rooms)	X	X	–	–
10. Tenure, vacancy	X	X	X	X
11. Rent or value	X	X	X	X
12. Furniture included in rent	X	X	–	–
13. Rent if unfurnished	X	X	–	–
14. Cost of utilities and fuel	X	X	–	X
15. Heating fuel (type)	X	S	–	X
16. Cooking fuel (type)	X	S	–	–
Household				
17. Count of households	X	X	X	X
18. Color or race of head	X	X	X	X
19. Size of household (number of persons)	X	X	–	X
20. Ownership of radio (1950 includes television)	X	S	–	X
Subtotal (including sample items)	20	18	8	13
Indices of Housing Quality				
Facilities				
21. Toilet	X	X	–	X
22. Water supply (1950 includes hot water)	X	X	–	X
23. Bath	X	X	X	X
24. Kitchen sink	–	S	–	–
25. Refrigeration	X	S	–	X
26. Heating equipment	X	S	–	X
27. Electric lighting	X	S	–	–
Maintenance				
28. Condition of repair	X	X	X	X

Descriptive and Financial Items	Items Enumerated		1940 Tabulations	
	1940	1950	Blocks	Tracts
Occupancy				
29. Room crowding	X	X	X	X
Subtotal (including sample items)	8	9	3	7
TOTAL (including sample items)	28	27	11	20

*S indicates 20 percent sample; not available for block tabulations.

Source: Modified after A. A. Twitchell, "Measuring the Quality of Housing in Planning for Redevelopment," in C. Woodbury, ed., *Urban Redevelopment: Problems and Practices* (Chicago: University of Chicago Press, 1953), p. 20.

fied as "needing major repairs" when parts of the structure required major repairs or replacements, such as floors, roof, walls, or foundation. This determination was made by an enumerator and was a subjective decision. The enumerator identified repairs to be "major" if continued neglect endangered the safety of the occupants. Essentially this item measured the maintenance level of the structure itself and did not measure the level of quality per se, e.g., a tarpaper shack, or a cellar, might be classified as not needing major repairs.

Considerable criticism of the narrowly conceived quality measure used in the 1940 Census ensued in the following years. The absence of information which would have been useful to various enforcement agencies in the areas of public health, code enforcement, and fire prevention received noteworthy attention. Items such as neighborhood conditions, plumbing operability, room size, and social conditions could not be obtained from the census.

The terms "substandard" and "sound" were not employed in the census. It was up to local agencies to make this evaluation. Officials concerned with this problem generally identified substandard units as those lacking a private bath, in need of major repairs, and/or having more than 1.5 persons per room. Although a crude measure, this approach used both structural and occupancy characteristics (within the constraints of the data available) at the micro level (city block).

The *1940 Census of Housing* produced startling figures concerning the intensity of substandard housing. Nearly half the housing (49 percent) was identified as substandard. This revelation, together with the severe shortage of housing units after World War II, encouraged Congress to pass the Housing Act of

TABLE 13-3
COMPARISONS OF 1960 AND 1970 HOUSING CENSUSES

Contents and Coverage	*1960*	*1970*
	Percent	Percent
Number of units at this address	–	100
Telephone	25	100
Access to unit	100	100
Kitchen or cooking facilities	100	–
Complete kitchen facilities	–	100
Condition of housing unit	100	–
Rooms	100	100
Water supply	100	100
Flush toilet	100	100
Bathtub or shower	100	100
Basement	25	100
Tenure	100	100
Commercial establishment on property	100	100
Value	100	100
Contract rent	100	100
Vacancy status	100	100
Months vacant	25	100
Components of gross rent	25	20
Heating equipment	25	20
Year structure built	25	20
Number of units in structure and whether a trailer	20	20
Farm residence (acreage and sales of farm products	25	20
Land use for farming	25	–
Source of water	20	15
Sewage disposal	20	15
Bathrooms	20	15
Air conditioning	5	15
Automobiles	20	15
Stories, elevator in structure	20	5
Fuel – heating, cooking, water heating	5	5
Bedrooms	5	5
Clothes washing machine	5	5
Clothes dryer	5	5
Dishwasher	–	5
Home food freezer	5	5
Television	5	5
Radio	5	5
Second home	–	5

Source: Table 1, *The 1970 Census and You*, U.S. Bureau of the Census (Washington, D.C.: Government Printing Office, 1973), p.3

1949. This act called for "a decent home and a suitable environment for every American family." Title I of the act authorized federal aid for development programs that included the acquisition, clearance, and reuse (sale or lease) of deteriorated or deteriorating areas that were predominantly commercial or industrial, if the reuse was to be predominantly residential.[3] This act set the stage for federal urban renewal programs which were given an added boost with the Housing Act of 1954.[4]

In the meantime, the *1950 Census of Housing* findings indicated significant upgrading of housing conditions since 1940. In 1950, conditions were classified according to the categories "dilapidated" and "not dilapidated." "A unit was to be reported as dilapidated when it had one or more serious deficiencies or was of inadequate original construction so that it provided inadequate shelter or endangered the safety of the occupants." A unit was also to be classified as dilapidated if it had a "combination of minor deficiencies to the extent that it did not provide protection against the elements or was physically unsafe. The new definition did not rely on the 'state of repairs' as had the 1940 Census and was considered an improvement."[5]

Many users still criticized the 1950 definition because it did not permit the identification of housing in early stages of decline or blight. The development of an intermediate level of condition was called for by some agencies, such as those working with urban renewal programs. Research on the problem led to dividing the "not dilapidated" category into "sound" and "deteriorating" levels. The threefold classification of "dilapidated," "sound," and "deteriorating" was adopted for the 1960 Census. "Special efforts were taken to make the 1960 definition of dilapidation the same as 1950. The sound and deteriorating categories were defined so as to agree with the not dilapidated category in 1950. A sound unit was defined as having no defects or only slight defects which would normally be corrected during the course of regular maintenance."[6]

Structural condition data are only one part of housing quality in the 1960 Census, and more widely accepted statistics on quality

[3] A. A. Twichell, "Measuring the Quality of Housing in Planning for Redevelopment," in C. Woodbury (Ed.), *Urban Redevelopment: Problems and Practices* (Chicago: University of Chicago Press, 1933), p. 41.

[4] A. Foard and H. Fefferman, "Federal Urban Renewal Legislation," in J. Q. Wilson (Ed.), *Urban Renewal: The Record and the Controversy* (Cambridge: M.I.T. Press, 1966), p. 91.

[5] U.S. Bureau of the Census, *Measuring the Quality of Housing*, op. cit., footnote 2, p. 1.

[6] Ibid., p. 1.

deal with both condition data and availability of plumbing. The terms "standard" and "substandard" that are now widely used as measures of housing quality reflect the use of these parameters. Recently, tabulations have been provided to which the labels of substandard and not substandard labels could be directly applied to published census categories. A substandard unit is:

1. Dilapidated, or
2. Lacks one or more of the following facilities: hot running water in the structure, flush toilet for private use, bathtub or shower for private use.[7]

The early emphasis on housing quality as a brick-and-mortar problem was never satisfactory. Because of this, in 1970 the housing quality variable, per se, was deleted. In part this decision was the result of unsatisfactory subjective considerations in measuring physical deterioration levels. Enumerators were not to be used in 1970 except in rural areas, which meant that occupants themselves would have to estimate conditions, a procedure with untold biases. It was also a fact that fewer units were structurally inferior in 1970 than before, and so there was less need for the data. But the biggest factor in reaching the decision involved recognition that housing quality was basically a social problem, neighborhood-related, and could not be easily defined by the Census Bureau. Moreover, housing quality became an issue more the responsibility of agencies such as the Department of Housing and Urban Development (HUD) and the American Public Health Association than of the Census Bureau. Although all three organizations concern themselves with "the mental, physical, and social well-being of people," the role of the Bureau of Census as a data gatherer rather than a social agency allowed the Bureau to partially retreat from this problem until it was more precisely defined and a clearer understanding of data needs unfolded. The lack of environmental and neighborhood data in census reports remains a crucial issue.

Notwithstanding the deficiencies in census definitions of housing quality and the lack of such data for 1970, it is possible to ascertain quality levels using surrogate measures. Data are still available on plumbing facilities, including bathrooms and showers, and these can provide reasonable estimates of housing condition. Living space conditions, aside from the unit itself, can also be determined. For example, "the variable 'percent of households living in crowded conditions' is an indicator of comfort."[8] Privacy can be measured by examining the number of single-member

[7] Ibid., p. 2.

[8] Executive Office of the President, Office of Management and Budget, *Social Indicators, 1973* (Washington, D.C.: Government Printing Office, 1973), p. 195.

households and married households living by themselves away from other relatives. However, it is not possible from census data to assess the operation of facilities or appliances in the household, nor the availability or reliability of household services. Neither is information available on household consumption patterns of goods and services. All of these areas are no doubt part of housing quality, as is the neighborhood. The setting of the house may be more important than the house itself in determining the quality of life for its residents. In fact, in some middle class and lower income neighborhoods, it is the environment around the home, not the unit itself, that speaks most importantly about quality levels. With this situation in mind, the annual Housing Survey conducted by the Census initiated a program in 1973 to assess neighborhood conditions.

SPECIAL SURVEYS

COMPONENTS OF INVENTORY CHANGE AND RESIDENTIAL FINANCE

A weakness in regular census housing data is that one can determine only net inventory changes. No specific information is available on demolitions, conversions, or new construction. The census first attempted to rectify this gap with the *1956 National Housing Inventory*, which studied the first half of the 1950's decade. This was followed by the *1959 Components of Inventory Change* (CINCH) that provided information for the whole intercensal period (1950-1960), as well as changes since 1956. The following seven enumerations were made:

1. Same Units (in both 1950 and 1959)
2. Unit Conversions
3. Merged Units
4. Construction of New Units
5. Other Sources of Additional Units (created from nondwelling units or by moving unit to site)
6. Units Lost – Demolition
7. Units Lost by Other Means (fire, flood, moved)

In conjunction with the *1959 Components of Inventory Change* a concurrent *Residential Finance Survey* (SCARF) produced information on mortgage status, how properties were acquired, indebtedness characteristics (interest, loan terms, etc.) and characteristics of occupants and properties in relation to the mortgage. In 1940, the finance information was an integral part of the census, but only owner-occupied units containing no business were covered. In 1950, residential finance data was gathered through a separate sample, by mail, after the regular census. The

questions asked in 1960 approximated very closely those used in the 1950 Census.

In 1970 the Components of Inventory Change information was published as Volume IV of the Census of Housing, and Residential Finance as Volume V. Neither should be thought of as special surveys, but are discussed here to preserve continuity. CINCH reports are available for fifteen SMSAs, and for the United States and regions in the aggregate. Data were assembled using a multistage probability sample. The contents closely parallel those of the 1960 inventory and the cross-tabulations of 1960 and 1970 information are perhaps the most useful parts of the CINCH program to geographers. The finance volume (V), is divided into six chapters that detail mortgage and debt characteristics for homeowners and rental units, including one chapter on one-unit homeowner properties with Negro owners. Information on the outstanding mortgage debt, manner of property acquisition, and homeowner expenses is documented.

ANNUAL HOUSING SURVEY

The Annual Housing Survey (AHS) is a new joint venture program sponsored by HUD and carried out by the Bureau of Census in an attempt to determine how well the inventory of housing is serving occupant needs. This survey includes information concerning changes from previous residences, the serviceability of plumbing and equipment, neighborhood conditions and services, as well as privacy and overcrowding indicators. The program was started in 1973 and the first findings are expected to be published in late 1975. The series of questions in this inventory requesting residents to evaluate neighborhood street conditions is noteworthy because it represents an attempt to provide information on the environment around the house, not just information on the unit itself and its occupants. The problem areas covered in the survey include: (1) street noise, (2) air traffic noise, (3) heavy street traffic, (4) odors, smoke, or gas, (5) trash, litter, or junk in streets or on properties, (6) abandoned or boarded-up structures, (7) rundown occupied housing, (8) commercial, industrial, or other nonresidential activities, (9) streets in continual need of repair or open ditches, (10) inadequate street lighting, and (11) street or neighborhood crime. Additional questions are asked on the adequacy of public transportation, schools, and neighborhood retail facilities. A capstone question asks whether the street was an excellent, good, fair, or poor place to live.

Once a unit gets in this survey, it remains, and each year a sample of new construction is added. One part of the survey is a

national record and the other is carried out inside SMSAs. There are sixty SMSAs included in the survey, divided into three panels. Each panel contains twenty cities. A separate panel of cities is sampled each year and in the fourth year the first panel is resampled. Therefore, one can only use this data to get highly aggregated estimates of the performance of the housing stock, but nevertheless, the continuous time series nature of the information will provide the first longitudinal view of housing in our history.

EMPLOYMENT PROFILES OF SELECTED LOW-INCOME AREAS

These reports contain detailed socio-economic data for sixty urban and seven rural areas having high proportions of low income persons. In the case of forty-seven of the sixty cities covered, a single survey of the city was conducted, but in four cases (New York, Los Angeles, Chicago, and Philadelphia) multiple areas were studied separately. Thus sixty surveys were conducted in fifty-one cities. The rural studies were conducted in Appalachia and other impacted areas, especially in areas where federal regional development commissions are active (Arkansas, North Carolina, New Mexico, to name a few). In one case an Indian Reservation (Zuni) is involved. For persons interested in poverty studies this series would be useful. Breakdowns of Spanish and Negro households are made, and statistics for employment, unemployment, job history, and factors related to job holding and turnover are examined. This report series is issued as a joint Population-Housing census publication.

CURRENT CONSTRUCTION REPORTS

Not to be confused with the Census of Construction Industries Reports (with a CC prefix) is the Current Construction Reports series (with a C prefix) which provides monthly, quarterly, and/or annual updates on housing starts, completions, sales, values, housing authorized by building permits, demolitions authorized by permits, and residential alterations and repairs.

Essentially the monthly reporting on housing starts began in 1959. A special one-time summary report was issued in 1972 for the period 1959-1971, and an historical compilation of housing construction statistics for the period 1889 to 1964 is also available in summary form. Housing starts are cross-tabulated by location – metropolitan and nonmetropolitan – size of structure (number of units), and by geographic region. Seasonally adjusted annual rates make time series evaluations possible. Many of the reports contain

data on housing in permit-issuing places, which means that coverage is only for those states or places that issue building permits.

USING THE 1970 CENSUS OF HOUSING

Using the *1970 Census of Housing* is both rewarding and frustrating to the beginner. It is an awesome task in that the complexity of the coverage encourages one to go astray, but also intriguing due to the comprehensive manner in which the various volumes are bound together in an interlocking coding system. Even if one has worked with housing documents from earlier years, the 1970 Census poses new challenges because of the great increase in the number of joint population-housing reports and the larger number of subject reports, let alone the increase in the number of metropolitan areas covered. The assumption in this discussion is that teachers could benefit most, aside from national and local summaries of housing conditions, from a general understanding of how the census volumes link together and where to go to extract useful generalizations from reports, and from a refresher statement on the hierarchy of definitions used in conjunction with reporting urban data. Attention will first be focused on the indexing arrangements in the census and on the potential of subject reports for classroom material.

The first frustration one encounters when searching for housing information involves a sense of helplessness in knowing where to start. Sometimes the standard series of reports (Volumes I-VII) are not needed at all. For example, Supplementary Report HC (16), entitled "Graphic Summary of the 1970 Housing Census" may be all that is required to answer questions on the overall quality level of United States housing, plumbing and equipment characteristics, and trends over the past few decades. As a matter of fact, all of the supplementary reports issued as part of the Census of Housing are useful interpretative devices that provide short and concise summaries of housing data. They represent material that has been reprinted from other reports, and contain a few pages of text which can be extremely useful. Moreover they are inexpensive, costing from ten to seventy cents each. Lastly, each is highly refined and focuses on a specific issue.

A geographer in need of 1960 and 1970 general comparisons of urban areas again need not refer to the basic census series, but to Volume II of the joint Population and Housing Census series entitled *General Demographic Trends for Metropolitan Areas, 1960 to 1970.* The fifty-two reports in this series include a United States Summary and separate booklets for each state and the

District of Columbia, in alphabetical order. The utility of these reports is underscored by the presence of an analytical text describing the population and housing trends reported in the tables. Distinctions are made between SMSA totals and information inside and outside central cities, but within the metropolitan area. An added feature is a choropleth map showing population change by county, 1960 to 1970, for each state report.

The basic Census of Housing reports are the best to use if one needs to have information on a specific urban area. Volume I contains data on housing characteristics for counties, cities, and states, and one report is issued for each state. For more complete information on a particular metropolitan area, turning to Volume II provides individual reports on housing characteristics for specific SMSAs. There are 243 reports in this series for SMSAs in the United States (excluding Puerto Rico). Each SMSA is numbered alphabetically starting with Abilene and continuing through Youngstown. If micro data at the block level are desired, Volume III is needed. There are more reports in Volume III than in Volume II because the number of cities covered includes some areas that contracted with the Census Bureau for inclusion.

Two other points of clarification should be mentioned in connection with using Volumes II and III. First, the Block Statistics reports are organized by states, so that Alabama is first, with Birmingham the leading entry, not Abilene, as was the case for SMSAs in Volume II. Therefore, the same cities have different numbers in the two volumes, and in some cases, cities that are treated as one for SMSA data summaries (Vol. II) are treated separately in the Block reports (Vol. III). Tampa and St. Petersburg are examples. They are treated together in report No. 218 in Volume II, and individually in Volume III (No. 50 is St. Petersburg; Tampa is No. 52). Second, detailed city block maps are available as part of the Volume III reports and should be an invaluable tool to the geography teacher. For a minimal investment one's own city report can be brought directly into the classroom for illustrative purposes.

Volumes IV and V examine Components of Inventory Change and Residential Finance respectively. Volume VI is the 1970 counterpart of earlier summaries of housing quality, and lastly, Volume VII contains nine subject reports, each of which is exceedingly useful to geographers. These reports by number and subject are –

1. "Household Characteristics by Household Composition," contains cross-tabulations of occupancy, income, and structural characteristics of housing. The summaries are highly aggregated.

2. "Housing of Senior Citizens," itemizes characteristics of the elderly and provides separate data for Negro and Spanish units in addition to summaries for all persons.
3. "Space Utilization of the Housing Inventory," cross-classifies data on household size, persons per room, structural and plumbing characteristics, as well as information on equipment, appliances, and finance.
4. "Structural Characteristics of the Housing Inventory," provides cross-tabulation of housing, using the same data categories as in Reports 1-3.
5. "Mover Households," cross-classifies households by year occupants moved into the unit. All households, Negro households, and Spanish households are itemized.
6. "Mobile Homes," identifies characteristics of these units. Summaries are given for states having more than 50,000 mobile homes and SMSAs with more than 10,000, in addition to United States and regional summaries.
7. "Geographic Aspects of the Housing Inventory," contains regional characteristics of housing by four census regions.
8. "Cooperative and Condominium Housing," synthesizes data on this form of housing and includes detailed information on states and SMSAs with more than 10,000 condominiums.
9. "Housing of Selected Racial Groups," covers housing conditions for minorities other than Negro and Spanish households. Included are data on American Indian, Japanese, Chinese, Filipino, and Korean households.

The final and perhaps most lucrative source of information for metropolitan areas are the individual Census Tract Reports which cover both population and housing data and contain tract maps for each city. The tract reports are arranged in alphabetical order by city (Abilene-Youngstown), much as the Volume II reports are arranged. There are 241 separate reports in this series. Tables recording population data have a "P" prefix and those dealing with housing data, an "H". Separate tables are provided for occupancy, structural, utilization, financial, equipment, and fuel characteristics for Negro and Spanish households.

The data in Census Tract Reports are far more comprehensive than those in Block Statistics, in that in-depth population and housing data are included and are available for entire metropolitan areas, whereas block data are confined to the urbanized area of the SMSA. This distinction is discussed more completely below in "Principal Definitions." The hierarchy of urban definitions is presented there along with a hypothetical map distinguishing the various city regions.

The geographer should be aware that libraries often have Census Tract Reports catalogued with Census of Population reports, not with Census of Housing material, so the user can be misled concerning the availability and contents of tract reports.

TEACHING APPLICATIONS

Census documents can be overwhelming to students, even at the university level, if they are sent to the reference shelves of the library unprepared. This situation arises because of the voluminous nature and variety of the census series and the multiplicity of scales at which data are presented. However, the information is also intriguing to the inquiring mind, especially to budding geographers. The maps that accompany many of the series transform remote data into a highly visual format and frequently entice the student into deeper investigation.

Most housing census data are in the form of endless tables, which also are vital resources for sophisticated multivariate analysis. This essay will ignore the many sophisticated applications such as growth projections and housing start analyses; instead the discussion here is intended for the general or beginning user.

At the elementary level, the census series on *We the Americans* offers graphic color-coded summaries, complete with photos, describing major population and housing characteristics of the populace.[9] The usefulness of these summaries for classroom purposes is endless. Many class projects could be extracted from this series, including bulletin board displays, map preparation, plays, and other activities. These reports would be especially adaptable to social studies classes, and could include many cross-cultural comparisons (Spanish, Black, Indian, etc.) as well as stage of life-cycle topics (young marrieds, elderly, middle class, and others).

For students in metropolitan areas the possibilities for detailed investigations in their own city and neighborhood are innumerable. Information at the local city block level allows students to identify their home, school, and frequently visited shopping centers. Even more data are available at the census tract level and would permit the more enterprising student to map associations among such variables as housing quality levels, the year homes were built, and owner occupancy levels.[10] Again, the city block

[9] U.S. Bureau of the Census, *We, the Americans* series (various titles) (Washington, D.C.: Government Printing Office, 1972-).

[10] John Fraser Hart, "A Census Tract Exercise in Local Geography," *The Journal of Geography*, Vol. LXXI (1972), pp. 326-339.

maps and the census tract maps would be invaluable tools to help students make associations, such as those mentioned above, and to create "original" studies. For example, there might be a study dealing with the moving patterns of families of students represented in the particular school (using present and past addresses), the location of relatives of the students, and in the mapping of "preference" of where students would like to live.

The more advanced student may want to make intercity comparisons by studying central city trends among several cities, or make comparisons between urban and rural housing quality levels.

At many schools ready access to detailed census documents is not possible and indeed is not necessary. A collection of maps and a few supplementary census reports as examples is all that is needed. The more mature student, however, may visit a local city or university library to satisfy more refined needs.

PRINCIPAL DEFINITIONS

Definitions of the areal units employed by the census need to be thoroughly understood to facilitate classroom discussions and successful searches in the census documents. The three most widely used urban definitions, therefore, warrant careful scrutiny; these are the standard metropolitan statistical area (SMSA), the urbanized area, and the central city. These three units are portrayed in map form in Figure 13-1. The hierarchical nature of the terms is evident, with the central city and urbanized area nested within the more inclusive SMSA category.

Standard Metropolitan Statistical Area. A standard metropolitan statistical area is a county or group of contiguous counties which contain at least one central city with a specified population (usually 50,000 inhabitants). In addition to the county, or counties, containing the city or cities, other contiguous counties are included in an SMSA if, according to certain criteria, they are socially and economically integrated with the central city (such as providing a significant number of commuters that work in the central city). SMSAs can cross state lines. One exception to this definition occurs in New England states where SMSAs consist of towns and cities, not counties.

Approximately 250 SMSAs are recognized in the 1970 census. The number changes as new areas qualify or other changes are made. The Office of Management and Budget, not the Census Bureau, oversees the designation of SMSAs. In 1973, for example, 4 new SMSAs were created, and 12 existing ones were consol-

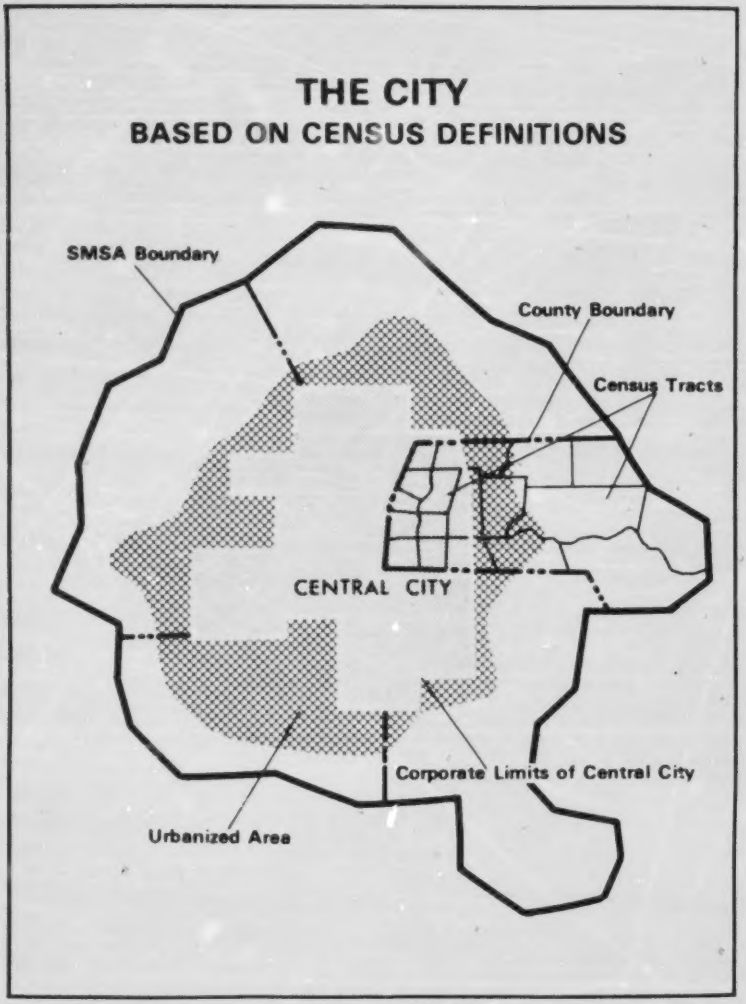
THE CITY
BASED ON CENSUS DEFINITIONS
SMSA Boundary
County Boundary
Census Tracts
CENTRAL CITY
Corporate Limits of Central City
Urbanized Area

Figure 13-1.

idated in 6 regions, making a total of 267 SMSAs. Additionally, the size of 98 were affected, and 14 were retitled.

For comparative purposes, the SMSA has certain deficiencies. It often includes a considerable number of rural persons because it overbounds the city (because county lines are used as boundaries), causing the region to frequently include more territory than is actually urbanized. At the other extreme, some urban areas might be omitted if they lie just outside the county boundary in an adjacent predominantly rural county.

Urbanized Area. The urbanized area definition partially overcomes the weaknesses of the SMSA classification. There is an urbanized area for all SMSAs because the basic building block for the urbanized area is the same as that for an SMSA (a central city of 50,000). Also included in the urbanized area are: (1) outlying incorporated places that meet population criteria (2,500 persons) and density criteria (closely settled areas of 100 dwelling units), (2) outlying enumeration districts with a population density of 1,000 or more inhabitants per square mile, and (3) other adjacent areas so as to make the unit contiguous, to eliminate enclaves, and to smooth out the boundary. Streets, roads, and creeks are used as the boundary units rather than county boundaries. As a consequence of this more precise measurement, the urbanized area of the city closely approximates the "built-up" area of the region that needs urban services such as that provided by municipal police, fire, sewer, water, and garbage agencies.

Central City. In 1970 a city with a population of 50,000 or more was the core of the SMSA. However, by 1973, definitions changed that allowed the city to have somewhat less than this figure and still qualify as the central city, provided the area met metropolitan character criteria. The central city is defined by corporate limits. The largest city of an SMSA is always the central city. There may be two central cities provided the smaller of the two has at least 15,000 people. In the latter case, the cities are considered twins and both are considered central cities.

Census Tracts. Census tracts are small areas into which large cities and adjacent areas have been divided for statistical purposes. Tract boundaries are established cooperatively by a local committee and the Bureau of the Census. Tracts are generally designed to be relatively uniform with respect to population characteristics, economic status, and living conditions. The average tract has about 4,000 residents. Tract boundaries are established with the intention of being maintained over a long time so that comparisons may be made from census to census. Tracts are generally numbered in a consecutive series, with separate series for the central city and for

TABLE 13-4
GEOGRAPHIC COVERAGE FOR TRACT AND BLOCK DATA

Year	Number of Cities Tracted	Year	Number of Blocks
1940	60		
1950	64		
1960	180	1960	750,000
1970	241*	1970	1,500,000

*Does not include six cities that were designated SMSAs on the basis of the 1970 census count that were not tracted.

Source: Calculated by author.

each county.[11] In the past three decades the number of cities for which tract data are available has multiplied rapidly (Table 13-4).

City Blocks. The smallest unit for which any census data are published is the city block, and the material available on this basis is restricted largely to selected housing data from the Census of Housing. Such statistics by blocks were published in 1960 for each city or urban place which had a population of 50,000. For 1970 each urbanized area was blocked. In addition, a number of smaller places were included in the program through agreements whereby the cost of collecting and publishing information was paid for by the city government. A city map showing block numbers accompanies each block housing report. Census tracts, too, are shown, and the block data in the one table in each report are arranged by blocks within tracts.[12] The number of blocks included in census surveys has doubled in the past decade (Table 13-4).

Enumeration Districts. Enumeration districts (EDs) are administrative divisions designated by the Census Bureau for data collection in rural areas where enumerators were used to gather information. These areas average 800 in population.

CENSUS OF HOUSING PUBLICATIONS, 1940-1970

The lists below outline the major volumes of the censuses from 1940 to 1970, with their contents. Although not a detailed description, these notations should provide the user with enough information to adequately find the major sources of housing data.

[11] This entire definition is a direct quotation from U.S. Bureau of the Census, *1970 Census of Population and Housing. Census Tracts.* (Washington, D.C.: Government Printing Office, 1972). Quoted from Appendix A, "Area Classifications," p. 1.

[12] This entire definition is a direct quotation from Raymond E. Murphy, *The American City: An Urban Geography* (New York: McGraw-Hill Book Co., 1974), p. 543.

1940 CENSUS OF HOUSING

Volume I (Series 1). *Data for Small Areas, by States*
Data for the United States, regions, states, counties, metropolitan districts, cities of 50,000, urban places of more then 2,500.

Volume I (Series 1). *Supplement: Block Statistics for Cities*
Data on eight descriptive and three quality items for each of 191 cities with a 1930 population of 50,000 or more.

Volume I (Series 1). *Supplement: Population and Housing Reports*, "Statistics for Census Tracts"
Nine descriptive and seven quality items for each of sixty tracted cities (for thirty-five cities tract coverage limited to corporate limits, and for the other twenty-five, extending to suburbs.)

Volume II (Series 2). *General Characteristics of Housing, by States*
Published in five parts, this volume contains basic statistics of all subjects for which information was collected.

Volume III *Characteristics by Monthly Rent or Value, by States*
Tables 1-5 for states relate to nonfarm housing and contain information on owner and renter units. The tables are repeated for each city of 100,000, and each metropolitan district.

Volume IV. *Mortgages on Owner Occupied Nonfarm Homes, by States*
Data on home financing. *Supplement A* contains statistics for mortgages on homes built from 1935 to 1940. *Supplement B* has statistics for mortgages on nonwhite homes.

Special Reports. *Housing Characteristics by Type of Structure*
Cross-tabulations of housing structure and dwelling unit characteristics.

Special Reports. *Population and Housing Reports on Families*
Cross-tabulations of housing and household characteristics.

An index of the items covered in the 1940 census, along with places for which data were gathered, is contained in: U.S. Bureau of the Census *Sixteenth Census of the United States: 1940; Housing: Index of Reports* (Washington, D.C.: Government Printing Office, 1945).

1950 CENSUS OF HOUSING

Volume I. *General Characteristics of Housing*
A bulletin was issued for the United States and for each state, District of Columbia, Territories, and Possessions; these were later bound into Volume I. Tabular data include information

for urban places of 2,500 or more, and for counties, rural farm and nonfarm, standard metropolitan areas (SMAs), and urbanized areas. Subjects include occupancy, structural, condition, equipment, fuels, and financial characteristics.

Volume II. *Nonfarm Housing Characteristics*

Bulletins were issued for each of 152 standard metropolitan areas with 100,000 inhabitants or more, for the United States, and for each of nine census regions. Housing characteristics in relation to monthly rent, value, sex and age of head of household, type of household, and family income were tabulated. Parts 2-5 contain ten tables each covering housing values, rent, condition, occupancy, structural, and household characteristics.

Volume III. *Farm Housing Characteristics*

Statistics on the characteristics of occupied rural-farm housing. Cross-classification are included for two basic tabulations, (1) number of rooms by year built, condition and plumbing, fuel, and household characteristics, and (2) condition and plumbing facilities by number of rooms, equipment, income, and household type.

Volume IV. *Residential Financing (Nonfarm)*

Detailed statistics for the entire United States and the four census regions go to make up one part. A second part includes information on mortgages, mortgage debt, property and owner-occupant characteristics for large standard metropolitan areas.

Volume V. *Block Statistics*

A bulletin was issued for each of 209 cities with 50,000 people or more (in 1940). Maps identifying blocks and census tracts accompany the bulletins. Data are given for each block, arranged by tract. Information on housing, although published as housing bulletins ("Selected Population and Housing Characteristics"), appeared in Volume III of the Census of Population. Statistics included occupancy and tenure, type of structure, condition and plumbing facilities, year built, persons per room, fuel and equipment, and rent and value. New York City reports were issued separately for several boroughs (Bronx, Part 126; Brooklyn, Part 127; Manhattan, Part 128; Queens, Part 129; and Richmond, Part 130).

1960 CENSUS OF HOUSING

Volume I. *States and Small Areas*, Series HC(1)

In state reports, information is shown for each SMSA, urban-

ized area, county, and places of 1,000 inhabitants or more in addition to state totals. Rural-farm and rural-nonfarm data are also tabulated. Occupancy, structural, condition and plumbing, equipment and fuel, and financial characteristics are covered. Data for units with nonwhite heads of household are published for each state with more than 25,000 in this group; there are no corresponding state tables for Spanish households.

Volume II. *Metropolitan Housing*, Series HC(2)

Data for urban places of 100,000 or more (134 in all) are contained in SMSA reports; for cities having 25,000 or more such units, data are available for nonwhite and Spanish households. Cross-tabulations of housing and household characteristics (occupancy, structural, condition and plumbing, equipment and finance).

Volume III. *City Blocks*, Series HC(3)

Data for total population, condition and plumbing, occupancy, value and rent, and overcrowding, based on a 100 percent sample. Blocks are arranged within census tracts.

Volume IV. *Components of Inventory Change*, Series HC(4)

Counts and characteristics of change, including new construction, conversions, mergers, and demolitions. Units classified as "same" in both periods, the 1959 characteristics are cross-tabulated by the 1950 characteristics for tenure, color, condition, and plumbing facilities. For units classified as "new construction," value and rent are cross-tabulated by number of rooms, number of persons and household composition.

Volume V. *Residential Finance*, Series HC(5)

Part 1 – Homeowner Properties. Data on mortgaged and nonmortgaged properties, owners, and mortgages for the United States, regions, and selected metropolitan areas. Information on first mortgage, total mortgage debt by government insurance (FHA and VA).

Part 2 – Rental and Vacant Properties. Data on mortgaged and nonmortgaged properties for the United States, including holder of first mortgage and government insurance status. Statistics broken down by properties with various numbers of dwelling units.

Volume VI. *Rural Housing*, Series HC(6)

Household tabulations by occupancy, structure, condition and plumbing, equipment and fuels, and financial characteristics.

Volume VII. *Housing of Senior Citizens*, Series HC(7)

Cross-tabulations of housing and household characteristics of units occupied by persons sixty years old and over.

A complete listing of the 1960 Housing Census publications is

contained in U.S. Bureau of the Census, *U.S. Census of Housing: 1960, Availability of Published and Unpublished Data* (Washington, D. C.: Government Printing Office, 1962).

1960 CENSUS OF POPULATION AND HOUSING

Considerable data on housing were included in the 1960 Census of Population and Housing. The descriptions which follow include only those materials relevant to housing; population items can be obtained from the individual volumes.

Volume I. *Census Tracts*, Series PHC(1)

This volume is arranged into parts, one for each of the 178 SMSAs (in alphabetical order), plus Middlesex and Somerset Counties, New Jersey. Detailed tract maps are provided for each SMSA. The tables are arranged, by tract, in the following manner:

H-1. Occupancy and structural characteristics.

H-2. Year moved into unit, automobiles available and value or rent

H-3. Characteristics of units with non-white heads (for tracts with 100 or more such units)

H-4. Characteristics of units with Puerto Rican heads (for census tracts with 400 or more units)

1970 CENSUS OF HOUSING

Volume I. *Housing Characteristics for States, Cities and Counties*, Series HC(1)

This volume is arranged into several parts: Part 1 – U.S. Summary, Parts 2-52 – states, Part 53 – Puerto Rico, and Parts 54-58 – outlying areas. Each part is divided into two chapters; Chapter A contains general housing characteristics, and Chapter B provides detailed housing characteristics.

Volume II. *Metropolitan Housing Statistics*, Series HC(2)

Bound in several reports, a United States Summary, SMSAs, and Puerto Rican SMSAs are included. Tables 1-8 provide statistics for owner and renter housing, Tables 9-10 statistics for vacant units, and Tables 11-18 contain statistics for Negro housing units.

Volume III. *Block Statistics*, Series HC(3)

Various reports issued for each urbanized area, and selected areas (not an urbanized area, but a city that contracted with the Census Bureau for block data), organized by states. Table 1 contains summary statistics for places of 2,500 inhabitants

or more, and Table 2 provides block data arranged by census tracts.

Volume IV. *Components of Inventory Change*, Series HC(4)

Reports are for selected SMSAs only. Data are given for the entire SMSA, the central city, and that area within the SMSA but outside the central city. Table 1 – characteristics of the Inventory in 1960 and 1970; Table 2 – characteristics of newly built units since 1960 and the same units as in 1960; Table 3 – 1960 characteristics of units removed and same units. Data for this volume were gathered in the CINCH Survey and are based on a multistage probabilities sample of housing in each of the selected cities.

Volume V. *Residential Finance*, Series HC(5)

Data are presented on the financing of privately owned nonfarm housing for the U.S., and the census regions, totals for SMSAs, central cities, suburbs (inside SMSAs but outside central city) and outside SMSAs. The outstanding mortgage debt, manner of property acquisition, and homeowner expenses are shown.

Volume VI. *Plumbing Facilities and Estimates of Dilapidated Housing*, Series HC(6)

Plumbing facilities and estimates of dilapidated housing are included for 1970 and 1960. Data are shown for SMSAs, counties, and smaller places.

Volume VII. *Subject Reports*, Series HC(7)

The following is a list of the various reports issued in this series.

1. Household Characteristics by Household Composition
2. Housing of Senior Citizens
3. Space Utilization of the Housing Inventory
4. Structural Characteristics of the Housing Inventory
5. Mover Households
6. Mobile Homes
7. Geographic Aspects of the Housing Inventory
8. Cooperative and Condominium Housing
9. Housing of Selected Racial Groups

Supplementary Reports Series HC(S1).

Twenty supplementary reports were issued covering a wide range of the data collected for the Census of Housing. A few are listed here:

1. Summary Housing Characteristics for the U.S., Regions, Divisions, and States: 1970
6. Detailed Housing Characteristics for the U.S., Regions, Divisions, and States: 1970

8. Characteristics of Occupied Housing Units by Year Structure Built and Tenure, for the U.S.: 1970
11. Year Household Moved into Unit for the U.S.: 1970
14. Characteristics of Spanish Language Households for the U.S.: 1970
16. Graphic Summary of the 1970 Housing Census

U.S. Census of Population and Housing Reports.

Several reports were issued in this series. These are:

1. Census Tracts – PHC(1)
2. General Demographic Trends for Metropolitan Areas, 1960 to 1970
3. Employment Profiles of Selected Low-Income Areas (bound under multiple covers)

Construction Reports and Related Publications.

Nine series were published pertaining to the efforts in the construction industry. The titles in the series are listed here:

C-20. *Housing Starts* (published monthly)
C-22. *Housing Completions* (published monthly)
C-25. *Sales of New One-Family Homes* (published monthly)
C-30. *Value of New Construction Put in Place* (published monthly)
C-40. *Housing Authorized in Individual Permit-Issuing Places* (published monthly)
C-41. *Authorized Construction, Washington, D.C. Area*
C-42. *Housing Authorized in Individual Permit-Issuing Places: Summary Statistics* (published monthly)
C-45. *Housing Units Authorized for Demolition in Permit-Issuing Places* (issued annually)
C-50. *Expenditures on Residential Additions, Alterations, Maintenance, and Repairs and Replacements* (published quarterly)

14

America Votes Series

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America Votes, published biennially, is a compendium of electoral data at the national and state levels in the United States. Each volume covers the two years immediately prior to its publication date. It gives comprehensive coverage of all senatorial, congressional, and gubernatorial elections by state with a breakdown by county, and in some cases, by wards or districts within major cities. For each state there is a map showing the county and other relevant divisions, and for each city one covering the wards or district divisions. These are keyed by number into the tables of electoral results. The 8-1/2 x 11 inch format of *America Votes* allows for easy reproduction for class use of these clearly-drawn full-page maps.

Aside from a brief introduction to each volume, *America Votes* simply lists without analysis of any kind the election results in normal alphabetical order from Alabama to Wyoming. Printed in large clear type, the average volume runs around 400 pages.

BACKGROUND

America Votes first appeared in 1956. Volume 10 appeared in 1973 and is officially the 1972 volume. Table 14-1 indicates the chronology and coverage of the series.

Described at the outset as a "continuing biennial collection," it is a privately financed and published series compiled by the Elections Research Office of the Governmental Affairs Institute located in Washington, D.C. Richard M. Scammon, the Institute's Director of Elections Research, has compiled and edited every volume thus far.

TABLE 14-1
AMERICA VOTES SERIES

Volume No.	*Title*	*Coverage*	*To Press*	*Year Published*
1	1956	1945-55	April, 1956	1956
2	1956-57	1956-57	March, 1958	1958
3	1958-59	1958-59	Not known	1960
4	1960	1960-61	February, 1962	1962
5	1962	1962-63	March, 1964	1964
6	1964	1964-65	October, 1966	1966
7	1966	1966-67	December, 1967	1968
8	1968	1968-69	May, 1970	1970
9	1970	1970-71	February, 1972	1972
10	1972	1972-73	September, 1973	1973

The idea for such a series first developed in the minds of a committee of the American Political Science Association in the early 1950's and came to fruition when financial support was given by the Edgar B. Stern family. The original committee established to advise on the content and format of the series consisted of such well-know election experts as George Gallup of the American Institute of Public Opinion, Arthur Krock of the *New York Times*, V. O. Key of Harvard University, and Allen Manwell of the Bureau of the Census. Periodically, other distinguished scholars have been added to the advisory committee.

The first three volumes were published by the Macmillan Company of New York, Numbers 4 and 5 by the University of Pittsburgh Press, and all subsequent volumes by the Congressional Quarterly, Washington, D.C. Although there have been several changes in the content and format of the series over the two decades it covers, the volumes are remarkably similar and obviously an effort has been made to keep them consistent in such a way as to allow for comparative time-scale use without difficulty.

In addition to the normal state-by-state coverage, Volume 1 contained a tabulation of the "Vote for President" from 1920 to 1954 by states, broken down by county and city, and by totals and percentages of Democrat vs. Republican vote. Volume 9 also contained a similar tabulation for the 1948-1970 period. Furthermore, the 1956, 1960, 1964, 1968 and 1972 volumes contained details of the presidential elections (including primary races) in those years.

To have the reader better understand the nature and significance of the volume-to-volume changes, a brief synopsis follows of the content for a typical state in Volume 1.

A profile sheet gives certain basic facts about the state. These include its population, number of representatives, votes in the electoral college, number and name of counties in each electoral division, names and party affiliation of the current governor, senators, and representative(s), a breakdown of both houses of the state legislature by party, and gross results since 1945 of all gubernatorial elections. A map of the state shows county boundaries, congressional districts, and cities over 25,000 at the most recent census (in the case of Volume 1, the 1950 census). Separate maps of cities over 500,000 showing ward and/or district boundaries are also included. A series of tables then follows giving the breakdown of votes for president, governor, and senator by county (and by wards for the cities over 500,000) with statistics on party plurality and percentages. The population totals from the latest census are included. The tables for congressional elections also contain comparative figures on voting by party since the post-World War II period.

A special entry under "Notes" at the end of the section contains explanations about "other" (third party) votes, descriptions of any changes in congressional boundaries, and the sources of data used. This last mentioned aspect is important as, contrary to logical expectations, there is no agency of the federal government charged with collecting electoral data, save the vote of the electoral college following a presidential election, and thus the figures must be collected from state or other local sources.

Significant changes have been made since Volume 1. Volume 2 includes urban area maps for Cook County (Illinois), the New York region, Eastern Massachusetts, and Houston and Washington are dropped from the over 500,000 cities. Volume 4 was able to use the 1960 census figures but due to changes in congressional district boundaries in 1962, some difficulties arise in relating the maps to the electoral and population data. Volume 9 included a new set of data for the six New England states which includes not only county-by-county figures, but also data for the larger towns and cities. Furthermore, as 1972 was an election year, presidential election results by state from 1948 are included for comparative purposes. Due to the unusually high third party votes in the presidential race and in certain senatorial elections in Connecticut, New York, and Virginia, special tabulations are made out of the normal Democrat vs. Republican context. Volume 10 contains, in addition to normal data, all congressional race figures in time series back to 1946. As only partial results of the 1970 census were available in time for Volume 9, the value of Volume 10 is enhanced by having the complete census figures included. On the

negative side, Volume 10 excludes data for many cities covered in earlier volumes. For instance, only Los Angeles, Chicago, Detroit, New York, Philadelphia, and Washington are included. Ten cities listed in Volume 9 are dropped: San Francisco, New Orleans, Baltimore, Boston, Minneapolis, Buffalo, Cincinnati, Cleveland, Pittsburgh and Milwaukee.

USING AMERICA VOTES AND ITS PROBLEMS

The activity developed by Risa Palm and Christopher Exline, which follows, uses electoral data on Ohio and Cincinnati from Volume 9 and data on income from the 1970 census to compare spatial relationships at different scales. This type of classroom activity is an excellent example of a geographical use of the data in *America Votes*. It also points up two problems. First, the further away in time one moves from the census figures, the less valid are any relationships drawn between the distribution of election results and census data. That is, a 1970 Ohio election and 1970 Ohio census data (as used by Palm and Exline) produce an infinitely more valid comparison than would one drawn from, say, 1968 election results and 1960 census data. This problem is, of course, a standard one in all such uses of aggregate data collected at different times.

The second problem relates to the paucity of urban coverage in Volume 10. The sixteen cities of Volume 9 are cut to six in Volume 10, thus severely restricting the possibilities for scale comparisons, and eliminating the chance of comparing two cities in the same state in any given election. The rationale given for dropping the number of cities is that large cities are generally attracting a decreasing share of the total vote cast. The fact is, of course, that an increasing proportion of the vote is from the larger metropolitan areas and that by ignoring these areas as a voting entity and insisting on focusing only on the central city, the importance of and changes in the electoral power of major metropolitan areas are masked.

One of the most attractive features is the presence in any one volume of all the electoral districts of the states in excellent and reproduceable map form.

The extensive redistricting carried out in most states over the last few years has given *America Votes* some headaches in trying to decide between emphasis on comparative data in time series and attempts to coordinate up-to-date census and electoral figures. This also presents an opportunity for a classroom activity. One

could, for example, compare 1960 and 1970 election data from Volumes 4 and 9 for a redistricting on the pattern of results.

Another important problem arises from the rigid Democrat vs. Republican syndrome so basic to the tabulation of the data. Minority parties seem to be increasing their activity and in many cases are a very fundamental element in the election results. In 1972, for example, the Schmitz-Anderson ticket of the American Independent Party received over one million votes and ran second in many counties. Similarly, in 1948 the Thurmond-Wright States Rights ticket topped the million mark and won three states. And in 1968 Wallace and LeMay attracted almost ten million votes and carried five states into the American Independent Party column. These aberations from the traditional two-party pattern are not ignored in *America Votes* but neither are they given the attention they deserve.

A series such as *America Votes* cannot be expected to include all electoral results at the national and state level. It is, however, regrettable that the format has not changed enough over its two decades to include available data that social scientists could well use and that reflect shifts in emphases in electoral studies and in society as a whole. Two examples will suffice. No data on referenda of any kind are included. In the late 1960's several states held anti-Vietnam war referenda or initiatives; there have been referenda on relaxing or tightening liquor laws; there have been an increasing number of "ecology" referenda on such issues as container recycling and anti-littering; and there have been votes directly on race-related issues such as busing and open housing. A study of the distribution of such voting patterns in any state as related to party support or to other socio-economic patterns, or the state-to-state comparison of such votes, could well be made if such data were included. Surely America votes also on these issues!

Another area of enormous importance in electoral patterns is the relationship among population, registration, voter turn-out, and results. The longstanding efforts at increasing voter registration and turnout among minority groups have been a crucial factor in changing many election patterns. The inclusion of such material even on a limited basis would enrich the volume as a source, especially in conjunction with census data on minority distributions.

Despite the drawbacks mentioned above, *America Votes* contains vast possibilities for use in classroom activities. Palm and Exline demonstrate one type of use and various others have been suggested above. It is then rather surprising that a thorough search

of the recent geographic literature on electoral topics and a cursory glance through some of the political science literature turn up few references to *America Votes* as a data source. Possibly electoral data is used from it without proper citation. Only two direct references were found. One was in an appendix on "Aids to Research in Political Geography" by Jeanne X. Kasperson in a political geography text-reader published five years ago.[1] The other, in a book entitled *Geography and Politics in America* by Stanley D. Brunn, listed *America Votes* as the source for four presidential election results maps.[2] *America Votes* remains, however, an excellent source of raw data and map bases for a variety of activities in the general field of electoral geography.

[1] Roger E. Kasperson and Julian V. Minghi (Eds.), *The Structure of Political Geography: Theory and Applications* (Chicago: Aldine, 1969), footnote 43, p. 507.

[2] Stanley D. Brunn, *Geography and Politics in America* (New York: Harper and Row, 1974), Figures 10-1 (p. 279) and 10-2 (p. 281).

15

Electoral Geography and the Concept of Scale

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Geographical analysis is frequently based on the study of relationships among variables in which an areal unit is used for an individual observation. It is important for geographers to recognize that results of such a study are strongly affected by the degree to which the data have been aggregated, or what we will call "scale." The purpose of this activity is to introduce the student to the use of a statistical data source, *America Votes*, and also to the application of a simple nonparametric method of analyzing bi-variate data sets. The change in both strength and direction of associations when larger and more diverse areas are used as individual observations demonstrates some of the pitfalls which may accompany ecological analysis. By completing this lesson, the student should be able to apply these concepts and skills in a wide variety of everyday contexts.

RATIONALE

Electoral geography, the spatial analysis of voting behavior, is a dynamic subfield of geographical research.[1] Vote totals provide data on political preferences of the electorate, a potential wealth of information on life styles, conflicts, and general cultural or special interest convergences of competing groups.[2] The voting decision itself is the result of complex influences, not the least of

[1] For example, see J. X. Kasperson, "Aids to Research in Political Geography," in R. E. Kasperson and J. V. Minghi (Eds.), *The Structure of Political Geography* (Chicago: Aldine, 1969), pp. 501-509; and N. J. G. Pounds, *Political Geography*, 2nd. edition (New York: McGraw-Hill, 1972), especially pp. 234-245.

[2] A. J. Mumphrey and J. Wolpert, "Equity Considerations and Concessions in the Siting of Public Facilities," *Economic Geography*, Vol. 49 (1973), pp. 109-121; and R. V. Prescott, "Electoral Studies in Political Geography," in R. E. Kasperson and J. V. Minghi (Eds.), op. cit., footnote 1, pp. 376-383.

which are patterns of personal influence and group dynamics which are not completely accounted for even by scholars of American political behavior.[3] Yet, the aggregate patterns of voting decisions are of value in the study of traditions of voting behavior as well as the distribution of various interest groups.[4]

Electoral geography has been used also to substantiate the general associations of population characteristics and voting behavior. Truisms regarding political behavior by individuals of certain economic status or ethnicity ("Chicano voters are wedded to the two major parties, and especially to the Democrats")[5] are sometimes restated on an areal basis ("the Republican Party in the North has traditionally received its greatest support from high-income areas")[6]. Maps of concentrations of selected populations are compared with maps of voting behavior to draw conclusions about the behavior of territorial units.[7] Since data available on voting behavior (that is, *behavior* in contrast to *preferences* as revealed in survey research) are usually areally aggregated, it is of benefit to the student of human geography to become familiar with not only these data sources, but also with the pitfalls of ecological-level analysis.[8]

OBJECTIVES

At the conclusion of this activity:

1. Students will have learned how to use statistics from *America Votes* volumes and the United States census.
2. Students will have gained experience and skill in drawing con-

[3] E. Burdick and A. Broadbeck (Eds.), *American Voting Behavior* (Glencoe: Free Press, 1959); A. Campbell, P. Converse, W. Miller, and D. Stokes, *The American Voter* (New York: John Wiley, 1960); W. Flanigan, *Political Behavior of the American Electorate* (Boston: Allyn and Bacon, 1968); and H. Enlau, *Micro-Macro Political Analysis* (Chicago: Aldine, 1969).

[4] V. O. Key and F. Munger, "Social Determinism and Electoral Decision: the Case of Indiana," in R. E. Kasperson and J. V. Minghi (Eds.), op. cit., footnote 1.

[5] M. R. Levy and M. S. Kramer, *The Ethnic Factor: How America's Minorities Decide Elections* (New York: Simon and Schuster, 1972), p. 83.

[6] P. F. Lewis, "Impact of Negro Migration on the Electoral Geography of Flint, Michigan, 1932-1962: A Cartographic Analysis," *Annals*, Association of American Geographers, Vol. 55 (1965), p. 10.

[7] Lewis, op. cit., footnote 6; Key and Munger, op. cit., footnote 4.

[8] W. S. Robinson, "Ecological Correlations and the Behavior of Individuals," *American Sociological Review*, Vol. 15 (1950), pp. 351-357; L. A. Goodman, "Some Alternatives to Ecological Correlation," *American Journal of Sociology*, Vol. 64 (1959), pp. 610-625; O. D. Duncan, R. P. Cuzzort, and B. Duncan, *Statistical Geography: Problems in Analyzing Areal Data* (Glencoe: Free Press, 1961); Hayward R. Alker, Jr., "A Typology of Ecological Fallacies," in M. Dogan and S. Rokkan, *Quantitative Ecological Analysis in the Social Sciences* (Cambridge: MIT Press, 1969), pp. 68-69.

clusions about independence of bi-variate data sets through comparison of maps and the use of a simple nonparametric statistic (Kendall's tau).

3. Students will understand the generalization that relationships between population characteristics (in this case, income), and voting patterns (percentage vote for the Republican gubernatorial candidate), which hold at one scale do not necessarily hold at other scales. They will have demonstrated that scale is an important factor in the associations which the researcher finds, and should conclude that the reader beware of applying areal associations at other scales.
4. The concepts of scale and ecological correlation will have been introduced or further developed.

STRATEGIES

The following lesson provides an example of how voting statistics from *America Votes* volumes can be studied and mapped. As the student works with this lesson, it will become clear that the scale at which ecological analysis is utilized may be an important factor in the accuracy of the generalization which can be made about relationships between phenomena. Associations of voting preferences and population characteristics which hold at one level of analysis may change in strength when larger and more diverse population units are used as individuals in the analysis.

In the first part of this exercise, the student deals with data obtained from common statistical sources. Students should be provided with data pertaining to a population characteristic (such as income from the Census of Population) and a voting pattern (such as percentage vote for the Republican gubernatorial candidate in the 1970 Ohio election, from *America Votes*). In this example students are provided with data for the state of Ohio (by county) and the city of Cincinnati (by wards).

Using the data on election results and income for the city of Cincinnati, the students construct maps comparable to Figure 15-1 (note that the data are ranked into five class intervals).[9]

A discussion of the relationship between the variables should accompany an examination of the maps. The following questions are suggested as a basis of such a discussion:

1. What is the relationship between voting results and the income distribution? Is there usually a relationship between Republican areas and high-income areas?

[9] The tract data will often have to be aggregated into larger ward units.

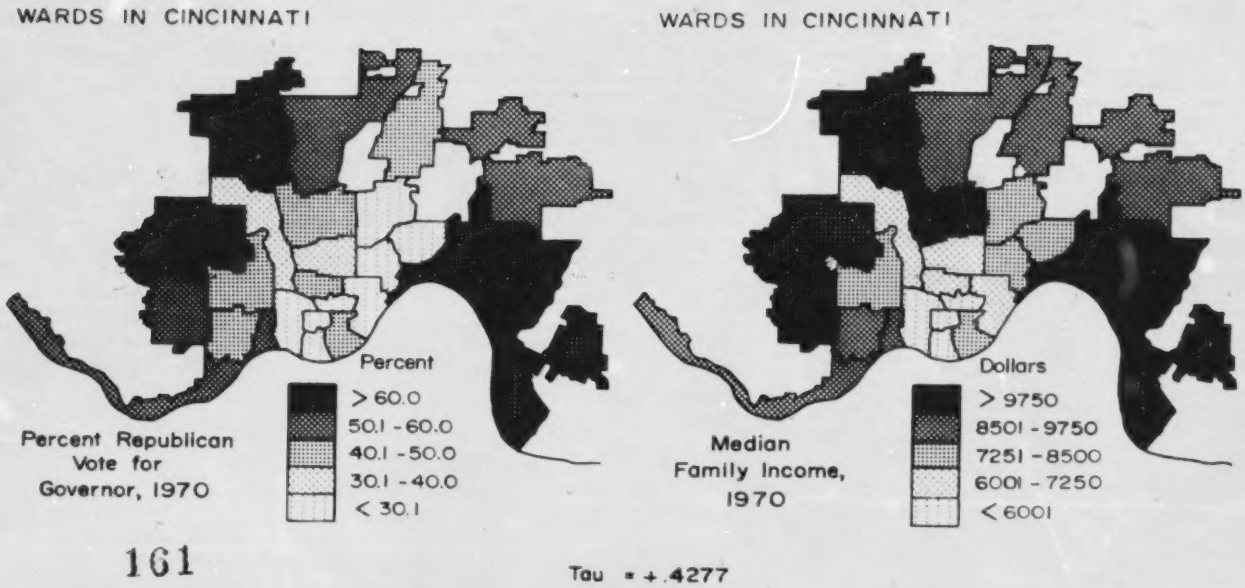

Figure 15-1. Association Between Percent Republican Vote for Governor and Median Family Income, 1970, for Cincinnati.

2. How could you account for those areas where the relationship is not so strong?
3. What general conclusions would you draw from the city maps on the relationship between Republican voting patterns and the income distribution?

After considering the first set of maps, the students, using the data for the state of Ohio, construct a second set of maps. These maps, based on larger areal units, should be comparable to Figure 15-2.

The class should speculate on why the relationship between the variables in the first set of maps is different from that of the second set. Discussion should emphasize the variation in the composition of the areal units involved. That is, relationships found to be strong at a large map scale may weaken when the scale of analysis changes. This is partially explained by the fact that as the population of the unit of measurement increases, the probability that units will portray extreme values decreases. The concept of scale should be introduced using as basis for discussion the conclusions drawn from the relations illustrated by the map patterns. *Fundamental to the concluding discussion is the realization that scale of analysis is all-important in the areal associations we think we see.*

The student may well pose questions as to the utility and reliability of simply comparing and contrasting map patterns to indicate strength of areal associations. There are statistical methods for considering the strength of the relationship between variables and the introduction of one such technique will lend support to the conclusions drawn from studying map patterns. Statistically, the relationship between the bi-variate data sets which have been mapped can be expressed by a summary non-parametric statistic called *Kendall's tau.*

Kendall's tau rank order correlation coefficient requires the use of ranked data rather than absolute values of variables. The correlation coefficient produced by the calculation of Kendall's tau is based on a comparison: "the actual number of conformant pairwise orders in the rankings with the maximum number of pairwise orders that would be achieved if the rankings were the same."[10] For example, consider a sample of Cincinnati's twenty-six wards:

WARD	a	b	c	d	e
Income ranking	2	5	1	4	3
Republican percent ranking	1	5	2	4	3

[10] M. Yeates, *An Introduction to Quantitative Analysis in Human Geography* (New York: McGraw-Hill, 1974), p. 193.

Figure 15-2. Association Between Percent Republican Vote for Governor and Median Family Income, 1970, for Ohio.

The income ranking is reordered from lowest to highest, restructuring the Republican ranking:

WARD	c	a	e	d	b
Income ranking	1	2	3	4	5
Republican percent ranking	2	1	3	4	5

The question posed at this point in the calculation deals with the rank ordered relationship of this bi-variate data set.[11]

Note that there are ten possible combinations of pairs of wards in the first row and that the wards are ordered numerically according to rank. The problem is to compare the paired orderings of the second row as compared to row 1. Let us consider the second row of ranks. Score every pair of wards which conforms to the logical sequence of row 1 as +1, and those which do not as -1. Thus, the possible pairs and associated scores are: c,a = -1, c,e = +1, c,d = +1, c,b = +1, a,e = +1, a,d = +1, a,b = +1, e,d = +1, e,b = +1, d,b = +1. The sum of these scores is +9. The maximum total, if income and Republicans had the same rank order would have been 10. Thus, to compute the strength of this association:

$$\text{tau} = \frac{\text{actual total of scores}}{\text{maximum possible total}} = \frac{9}{10} = +.90$$

Considering the case of Cincinnati and Ohio the correlation between income and Republican vote at the city level was .4277, while at the state level, the relationship was -.1741.[12]

CONCLUSIONS

This lesson illustrates the use of several techniques of data analysis. In considering the data and forming generalizations regarding the strength of relationships at various levels of inquiry, the student must draw upon his experience and synthesize a great deal of information. The teacher will find it profitable, at any point in this lesson, to interject "everyday" examples of the relationship between socio-economic and electoral variables. It is hoped that the student will be able to discover, on his own, instances in which relationships at one scale of analysis are assumed to hold true when aggregated, and recognize the pitfalls of this type of generalization.

[11] M. G. Kendall, "A New Measure of Rank Correlation," *Biometrika*, Vol. 30 (1938), pp. 81-93; and Yeates, op. cit., footnote 10.

[12] Like the parametric correlation coefficient, tau varies from +1.0, a perfect positive relationship, to 0.0, no relationship, and -1.0, a negative relationship.

16

The Census of Business

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HISTORY

Compared with the Census of Population, the Census of Business is a mere fledgling struggling toward maturity. It was born in a period of economic upheaval, the Great Depression, at a time when the United States had just become a dominantly urban country. This combination of circumstances provided the backdrop for congressional action implementing a bench mark study for business in the United States. This "child of the depression" is found as part of the *Fifteenth Census of the United States: 1930,* in a subsection entitled *Census of Distribution,* composed of three volumes and a series of miscellaneous reports. The base year was 1929; the focus was retailing and wholesaling.

In rather rapid succession following this first effort, the Roosevelt administration sponsored three more censuses before reaching another decennial anniversary. The *1933 Census of American Business* was done in 1934 under the auspices of the Civil Works Administration and is notable for the change in name and for the enumeration of services, in addition to retailing and wholesaling. The *Census of Business: 1935* finally provided the name by which the census has been known since that time. Possibly as a measure of New Deal progress, or as a make-work project, the Works Progress Administration (WPA) provided a 1935 update, the *Census Survey of Business: 1937-38.* This sampling census is the only undertaking of its kind in its history. Finally, the initial burst of activity and interest was capped by the *Sixteenth Census of the United States: 1940* which had as a subsection the *Census of Business,* based on 1939 data. This occasion marked the second coincidence of a business census with a decen-

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nial Census of Population, and also marked what was to be the last opportunity to provide, on a regular basis, quinquennially, business data that might provide approximate temporal coincidence with population data. (How pleasant it is to contemplate business data whose collection might periodically match the measurement of consumer income, as reported in the Census of Population.)

If there were going to be a regular pattern to the *Census of Business: 1930, 1935, 1940* . . ., World War II successfully interrupted that possibility. Certainly Congress cannot be faulted for neglecting special censuses in favor of concentrating efforts, money, and manpower on successful conclusion of the war. In 1948, we returned to the task of measuring business, and the ensuing *Census of Business: 1948* marked the end of an era in the gathering of business statistics. This was the last of the classical field canvasses, with its large force of enumerators personally collecting data.

The *Census of Business: 1954* was conducted by a mail survey, and its basic methodology set the standards for all subsequent censuses. Another marked change was provided in 1954 with the special report on the central business district. The publication of these latter reports followed the major CBD studies of Murphy, et al., and also appeared at a time when the American city was undergoing the pains of post-War adjustment, with its attendant urban sprawl and suburbanization of shopping facilities, personal and business services, and wholesale distribution facilities.[1]

Following the 1954 census, data were produced for 1958, 1963, and 1967. The 1958 census reported data for major retail centers, other than business districts. Of these censuses, 1963 was most notable for its addition of substantial data on merchandise lines for retailing and commodity lines for wholesaling. The final reports of the latest census, *1972 Economic Censuses,* are now being distributed.

In summation, the first Census of Business was taken in 1930, using 1929 data, and was published in 1933. Since then, there have been ten additional censuses: 1933, 1935, 1937-38, 1940(39), 1948, 1954, 1958, 1963, 1967, 1972 – one of which, 1937-38, was a sampling. The interval is an irregular one, and the publication dates are most often two to three years past the date of the census.

[1] Raymond E. Murphy, J. E. Vance, Jr., and Bart J. Epstein, *Central Business District Studies.* Reprints from *Economic Geography* with additions (Worcester, Mass.: Clark University, 1955).

RESEARCH UTILITY

The basic form and style of the Census of Business was established in 1930. Recent volumes are compatible and comparable, but as the years have passed the census has resembled a growing human being; it has become larger, weightier, and more sophisticated without giving up its basic structure. Focusing only on retailing, the universe has grown from 1,543,158 stores with sales of $49,114,653,269 in 1929, to 1,763,324 stores enumerated and surveyed in 1967, with total sales of $310,214,393,000! Add to this the change in kinds and types of business and the reasons for data proliferation and reporting sophistication become clear.

The *1929 Census of Distribution* focused on retail and wholesale primarily, and peripherally on hotels; products of manufacturing industries by kind, quantity, and value; retail chains; and distribution of sales of manufacturing plants. The 1933 census added a volume on services, amusements, and hotels, a series that has been kept on an equal footing with retail and wholesale since that time. Also, since 1929, there have been occasional miscellaneous reports which reflect particular problems or interests at the time of the census. Although these special reports may hold data of concern to a particular practitioner, they are not in the main stream of census coverage. Therefore, our emphasis here will be placed on data concerned with retail, wholesale, and services.

KEY DATA

Considering the reputation of the federal government for complicated forms and questionnaires, the questions asked in the Census of Business are simple and few. The agglomeration and manipulation of these data into a variety of cross-tabulations account for the voluminous reports produced.

In reporting the census results, there are some common important characteristics belonging to retail, wholesale, and services, namely, numbers of establishments and dollar sales, number of proprietors of unincorporated businesses and all employees, and payroll by kind of business. These data provide a measurable continuum from 1929 to 1967 with only a few modifications due to changes in definitions. For wholesale it is also possible to get data for operating expenses and stocks on hand. Finally, wholesale data contains information on type of operation (merchant wholesalers, agents and brokers, and manufacturers' sales branches and offices).

These data in turn provide a basis for the cross-tabulations, only some of which are shared by the major reporting divisions

(Table 16-1). All of these tabulations are limited by the original data, admittedly simple. Focusing on the data and the tabulations aspatially, there apparently is little more that a geographer could desire, whether the geographer is a teacher, business practitioner, or an urban researcher. This does not mean that the data are all inclusive, merely that it is probably impractical to hope for more detail.

TABLE 16-1
CROSS-TABULATIONS FROM THE 1972
RETAIL, WHOLESALE, AND SERVICES CENSUSES

Key Tabulations	*Available for Retail = R, Wholesale = W, Services = S*
Chain vs. Independent (single vs. multiunits)	R W S
Employment and Payroll	R W S
Credit	W
Sales Size Group	R W S
Operating Expense	W
Legal Form of Organization	R W S
Cities Size	R W S
Merchandise/Commodity Lines	R W
Sales by Class of Customer	W

Source: U.S. Bureau of the Census, *1972 Economic Censuses* (Washington, D.C.: Government Printing Office, 1974).

SCALE AND REPORTING UNITS

Viewing business at a national scale provides a collection of interesting facts and some mind-boggling sales figures. The initial emphasis for all parts of the Census of Business is national summaries. Under this heading the researcher has available the maximum amount of "straight" and manipulated data. In fact, the national data provide a base for a comprehensive analysis and narrative that accompanies the census, produced by the bureau's staff. In view of the Bureau of Census's constant concern with disclosure, and consonant with the handling of large amounts of data, the emphasis and variety of information on a national scale is understandable.

Data are also reported for geographic regions and divisions, states, counties, cities (in a range of sizes), standard metropolitan statistical areas (and standard metropolitan areas and metropolitan districts in appropriate years), and a fairly recent focus on the interior of cities. Generally, the same data and cross-tabulations are available for geographic regions and divisions and states with a

subsequent diminution in the amount and complexity of reported data as one approaches cities of very small size; the minimum reported data are the number of units by kind of business for these cities as well as for the major retail centers in the special MRC Reports.

It is worthwhile noting here the excellent and comprehensive map coverage of the United States that is available in the Census of Business. Of greatest value to the geographer are the state base maps which distinguish county lines, SMSAs, and major cities (usually in two size ranges).

Despite the cartographic work, it is within the spatial context that geographers encounter their major difficulties with Census of Business materials, although the temporal aspect of the data may cause consternation. Apparently, the scale of the data fit well with the geographic research emphasis of the 1940's and 1950's, but recently there has been a remarkable focus on the functional parts of the city, as well as strong interest in business as exemplified by the early "quantifiers" and those in marketing geography.[2] It is at this large scale that the geographer has been particularly frustrated, with only slight amelioration from the reports on the central business districts and major retail centers that commenced in 1954. This large scale need and utility was recognized within the Bureau of Census in 1937 when Malcolm Proudfoot prepared and published his bench mark study on Philadelphia.[3] However, seventeen years elapsed before the census was revised and the public was given some of the fruits of this initial labor.

LARGE SCALE REPORTS

The evolution of the large scale (interior city) reports demonstrates recognition of needs as well as an attempt to make a popular report more comprehensive and useful. Page 3 of *CBD Bulletin – 1* (1954) sets the tone for what followed: "The primary objective of this operation is to provide a basis for comparing changes in business activity in the Central Business District with those in the remainder of the metropolitan area or of the central city." The CBD's were delimited by census tract committees using tract boundaries![4] A total of ninety-five cities or parts of cities (e.g., Brooklyn, N.Y.) were reported for 1954.

[2] Larry S. Bourne (Ed.), *Internal Structure of the City* (New York: Oxford University Press, 1971).

[3] Malcolm Proudfoot, *Intra-city Business Statistics for Philadelphia, Pennsylvania.* Special report in *U.S. Census of Business: 1935* (Washington, D.C.: Government Printing Office, May, 1937).

[4] Geographers can surely challenge the use of census tract boundaries to delimit a functional area within the city.

Central business district reports were available in 1958 only for those cities of 100,000 or greater population in which there was a census tract committee that responded to the bureau's inquiry regarding the CBD. Therefore, the universe "swelled" to ninety-seven, and some data on major retail centers were also added. By 1963, the reports were titled *Major Retail Centers.* The CBD was defined as ". . . an area of very high land valuation, an area characterized by a high concentration of retail business, offices, theaters, hotels and 'service' businesses; and an area of high traffic flow", and these CBDs were delimited on census tract lines with few exceptions. Major retail centers, first delineated in 1958, were defined as

> . . . those concentrations of retail stores (located inside the SMSAs in which the CBD cities are located but outside of the CBDs themselves) which include a major general merchandise store usually a department store. MRCs include planned centers, string streets and combinations of the two.

The central cities had to have a population of 100,000 or more in order to qualify for a report, resulting in a coverage of 116 cities.

Finally, with what might be maturity status, the 1967 reports were available by state for all SMSAs. Small SMSAs received less attention (in terms of data reported) than the large 100,000 plus central city SMSAs, but were nevertheless represented. These reports represent a synthesis of data from the whole Census of Business, but the emphasis was on retailing.

Thus the reporting scale of the Census of Business has evolved to a more interesting stage. It is now possible to study national trends and apportionments back to 1929 (along with state, geographic divisions and regions, metropolitan areas, and selected cities in detail), and some city interiors back to 1948. The major limitations are provided by the data collected and the census disclosure rules.

NEEDS

As a researcher in retail marketing geography and CBDs, it is possible for the author to rejoice in the availability of more data for small areas within the Census of Business reporting matrix. Despite the improvements (which have been many), there is still substantially more that can be done.

Retail statistics are relatively well developed and are ahead of services and wholesaling regarding data and reporting at a large scale. The Census of Business is a repository of large amounts of information that will never see the light of day, and which are

basic to our understanding of the marketing process which underlies our very existence and our spatial organization. It is no longer sufficiently instructive to have numbers and dollars and employment data alone or these same data cross-tabulated for large units, the nation, state, SMSA, or the city alone. At best this is reporting that permits us a view equivalent to conventional high altitude aerial photography. We as geographers and we as a nation must immediately grapple with the problems of spatial organization in cities. The nation has "renewed", "rehabilitated", and "modeled" its cities, and is now subsidizing "new towns." The data base for all this effort is the past and the present, and each represents a monumental assembly task for the urban researcher. Could not the work of a group of scholars like Berry, Tennant, Simmons, and others in Chicago, Applebaum and Schapker in Cincinnati, or other groups of geographers and planners throughout the United States, have been simplified and facilitated by the use of data already collected and stored? There are few secrets in business, and the most basic business data are available, by simple observation, to an interested public. Therefore, despite the more recent enhancement of retail data, wouldn't it be nice to know:[5]

The names of the major stores in a city,
where, exactly, stores are located – at a large scale,
the sales range of all retail stores,
the sales and gross areas of retail stores,
the length of tenure at the present location,

and wouldn't it be nice to have the data available and mapped at least for all SMSAs. The data listed above are readily available to the field researcher with the time, talent, and money to do the necessary work.

Perhaps it is not reasonable to dwell on or embellish retail needs without addressing the other major categories in the Census of Business. In this age of quarternary activities wherein the service sector of the economy becomes progressively more important, does "selected services" fulfill the needs of the business researcher? Is there a need for more data in additional forms? Perhaps most important at any scale, where are the nation's offices? The Census of Business was of little or no use to Armstrong in her study of offices in New York, nor did it help Murphy, et al., nor does it give us the complete CBD picture today.[6] Manners recognizes the "foot-loose" office as a major

[5] No implied criticism of the Bureau of Census is intended. Practitioners who use Census data recognize the limitations with which that office operates, not the least of which is an often insensitive and niggardly Congress.

[6] Regina Belz Armstrong, *The Office Industry: Patterns of Growth and Location.* A report of the Regional Plan Association (New York: 1972).

metropolitan planning problem, and the urban researcher is left with a business data void that he can fill only with painstaking work that in many ways repeats Bureau of Census activity.[7] Again, as with retailing, the fine spatial detail is missing, thereby making the Census of Business a better small scale indicator than a large scale tool.

Finally, wholesaling appears to be a "stepchild" despite the detailed commodity data and special reports that can be found. Examination of the literature on business from a geographic or marketing viewpoint places this activity in an interesting perspective. (A Journal of Wholesaling? No. A Journal of Retailing? Yes!) Where is the accent in Christaller, Losch, Berry and others? Certainly not on "response to aggregate demand"! Vance in his classic study of wholesaling geography could depend on the Census of Business only for small scale data.[8] Possibly in defense of Census Bureau handling of wholesaling data is that wholesaling's scale may, indeed, lend itself to a reporting scheme less spatial than retailing or services. Nevertheless, wholesaling is an integral part of the marketing system that underpins our urban and economic systems.[9] Where are the wholesaling districts? Where are all the wholesaling activities in the city? Are there wholesaling compatabilities (as there exist in retailing associations)? The Census Bureau knows, but doesn't tell.

It is unlikely that a researcher in a specialized field of knowledge will find all that he would like from sources such as the Census. We can aspirate needs, general or esoteric, and make a forceful case for their satisfaction. At the same time we must recognize the practical constraints placed on public agencies. Unexpressed needs are rarely satisfied; expressed needs may not be satisfied, but only through requests for new data or special treatment of existing data can the Census Bureau know the direction to take when and if funds and personnel and equipment are available. Until those happy times arrive, researchers will have to be content with the storehouse of good geographic data that is currently available.

[7] Gerald Manners, "The Office in Metropolis: An Opportunity for Shaping Metropolitan America," *Economic Geography*, Vol. 50 (1974), pp. 93-110.

[8] James E. Vance, Jr., *The Merchant's World: The Geography of Wholesaling* (Englewood Cliffs, N.J.: Prentice-Hall, 1970).

[9] Business as reported by the Census is a dominantly urban pursuit. This justifies the accent on urban geography.

SUMMARY

Business statistics for the United States have been available to the public for only forty years.[10] During this period these data have found their way into a multitude of published geographic and marketing studies, and no doubt have been used in at least equal intensity within the research departments of business, giving rise to great numbers of unpublished and proprietary reports. A complete listing of these works would be neither practicable nor more instructive than a few summary statements.

Possibly the best and most comprehensive published studies using Census of Business data are those produced by the Census Bureau itself in the narrative and graphic summaries that accompany the Censuses. In addition, there are major commercial publications that lean heavily on Census of Business data – population, manufacturing, and business. The most overpowering is Rand McNally's *Commercial Atlas & Marketing Guide*, followed in scope by *Sales Management's* "Survey of Buying Power", both of which are annual marketing and geographic tools which depend on the Census of Business for actual data or for projection base-points.

Shortly after business data became available from the Bureau of Census a substantial number of studies by geographers and others on the urban economic base appeared, with classic studies by Hoyt, Andrews, Alexander, and Alexandersson in the forefront.[11] Of equal concern were studies having to do with the classification of cities by Harris (suburbs, too), Nelson, Jones, et al., and Forstall, editor of Rand McNally's *Commercial Atlas* up to 1973.[12] Of more recent vintage, but in a classic cast, are Vance's

[10] The *Census of Distribution: 1929*, the precursor to the *Census of Business*, was first published in 1933.

[11] The economic base has been a concern of Homer Hoyt, "The Utility of the Economic Base Method in Calculating Urban Growth," *Land Economics*, Vol. 37 (1961), pp. 51-58; Richard B. Andrews, "Mechanics of the Urban Economic Base: Historical Development of the Base Concept," *Land Economics*, Vol. 29 (1953), pp. 161-167; John W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions," *Economic Geography*, Vol. 30 (1945), pp. 246-261; and Gunnar Alexandersson, *The Industrial Structure of American Cities* (Lincoln, Nebraska: University of Nebraska Press, 1956).

[12] The early work in functional classification of cities can be found among Chauncy D. Harris, "A Functional Classification of Cities in the United States," *Geographical Review*, Vol. 33 (1943), pp. 88-99; Howard J. Nelson, "A Service Classification of American Cities," *Economic Geography*, Vol. 31 (1955), pp. 189-210; Victor Jones, Richard L. Forstall, and Andrew Collver, "Economic and Social Characteristics of Urban Places," *The Municipal Yearbook* (Chicago: International City Managers Association, 1963), pp. 85-157; and Richard L. Forstall (Ed.), *Commercial Atlas & Marketing Guide* (Chicago: Rand McNally & Company, 1973).

study of wholesaling, and Gottmann's regional urban study, *Megalopolis.*[13]

It is at a small scale that Census of Business data have been most useful in the past. Large scale data can prove useful in comparing cities within metropolitan areas or to some extent by placing the CBD in a comparative framework within its city or SMSA, or to a degree with MRCs within their SMSA. City and county data appear in virtually all master plans, local economic surveys, and in Chamber of Commerce "handouts". No one who has researched the city from a business viewpoint can argue the emphasis of a single reference – a landmark, large scale study, not often cited, but the bellwether of what was yet to come – Proudfoot's 1937 study of Philadelpha.[14]

The Census of Business has made an impact on geographers' work and contributed to geographic knowledge. The data at all scales are still sufficiently diverse to allow continuing research by all those interested while they await improvements from the Bureau, and while they continue to supply large amounts of primary data on their own.

[13] Vance, op. cit., footnote 8; and Jean Gottman, *Megalopolis: The Urbanized Northeastern Seaboard of the United States* (New York: The Twentieth Century Fund, 1961).

[14] Proudfoot, op. cit., footnote 3.

17

Too Many Gasoline Service Stations? An Application of the United States Census of Business

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The energy crisis of the winter 1973-74 had its most direct and widespread effect on the people of the United States in the form of shortages and rising prices for gasoline. People were particularly surprised as the shortage followed a period of gasoline surpluses and price wars between the "independent" and the "major" oil companies. During the shortage, most gasoline service stations curtailed their hours of operation and some were permanently closed. Reacting to criticism, including that of an artificially created shortage, some major oil companies defended their decision to permanently close service stations with the assertion that there were too many gasoline service stations.

Seizing on this assertion and asking the question: "Are there too many gasoline service stations?" should arouse the geographic curiosity of the mind. If this is true across the entire country, or only in parts of the country, how long has it been true? What is the best approach to finding answers for these questions? Where can data be obtained? These questions offer an excellent opportunity to familiarize geography students from junior high school through college with some of the attributes of Census of Business data.

As the analyzer of places, the geographer relies on inquiry concerned with: (1) places as an end in themselves such as retail centers or strips along a major highway, (2) types of activities such as the retailing of gasoline and related products at gasoline service stations, and (3) human economic organizations such as nationwide oil companies that franchise gasoline service stations. However, the Census of Business offers very little data on individual business organizations, and available data are restricted to larger geographical areas, with the exception of some aspects of retail

data for shopping centers.[1] Thus data for geographic inquiry of the marketing structure and operation of major oil companies are necessarily sought from trade journals or from the companies themselves, but not the Census of Business. County level census data for individual places is available but not very satisfactory for densely settled counties where more detail is sought, nor for sparsely settled counties where data are frequently not disclosed to protect individual businesses. Fortunately, county census data are amenable to inquiry of gasoline service station activity across multi-county or state areas.

It is the purpose of this essay to demonstrate an application of the *U.S. Census of Retail Trade* and the type of geographic inquiry focused upon an activity to deal with the real-world question: "Are There Too Many Gasoline Service Stations?".

OBJECTIVES

This project seeks to achieve several instructional objectives enroute to answering the question about the number of gasoline service stations. The first is to develop student capability to critically evaluate data definitions and assumptions from the Census of Business. A second objective is to develop skills in utilization of comparative frameworks such as per capita ratios and visual map correlations. Finally, an important objective is to develop a sensitivity to the opportunities for alternative interpretations of the same data, dependent upon the goal or viewpoint of the interpreter.

TEACHING STRATEGY

This project treats a topic of inquiry with which students have individual real-world experience so that the responsibilities for data preparation, analysis, and interpretation can be shifted to the student more easily. Each student is assigned to a role-playing group charged with developing a supporting or refuting position after having received appropriate evidence on the issue of number of service stations. Utilization of groups for playing out roles facilitates sharing of different personal experiences and encourages students to learn from each other as well as from the instructor.

The general procedure for each group is essentially the same: evaluate census data; identify data contexts such as per capita ratios; group and map the data; describe and analyze map patterns; and formulate a position on the issue using the evidence

[1] See the discussion of data scale by Bart Epstein in the preceeding paper.

developed. Each step in the procedure may have a different mix of instructor/student preparation of materials depending upon time available in classroom. Thus this project can extend from two to several class periods. Regardless of the length of the project, it should be kept in mind that a concensus on the issue is highly unlikely and that the merits of the project rest in achieving the stated objectives.

IMPLEMENTATION

PREPARATION OF MATERIALS

The first step is to select a multi-county study area of fifty or more counties appropriate to the interests of the class and including both rural and urban areas, and areas traversed by the interstate highway system. The study area may cover an entire state, or sets of counties selected for economic and demographic similarity, such as groups of ten counties each located astride an interstate highway, off the interstate highway system, in rural areas, in metropolitan areas, or in recreation areas. Next, the instructor needs to decide on the nature and timing of student involvement in data preparation, and the topics to be developed by the class as a whole or in role-playing groups.

This done, the following materials need to be procured: (1) the appropriate volume on *Retail Trade, Area Statistics* from the latest Census of Business,[2] (2) county population data from the *1970 Census of Population,* (3) a base map naming counties in the study area, (4) a state highway map showing county boundaries, and (5) a population distribution map for the study area if such is available. From these sources the following information should be prepared, by county, in tabular form: (1) number of gasoline service station establishments, (2) volume of sales in thousands of dollars, (3) percent of total retail sales represented by gasoline service stations, (4) 1970 population, (5) number of persons per establishment, (6) amount of sales per establishment, and (7) sales per capita.[3] Each set of data should be grouped into quintiles and student groups should prepare colored pencil maps from the data (or, if there are time constraints, the maps can be prepared by the

[2] As of this writing the most recent Census of Business available was 1967 with the appropriate material found in Volume II, *Retail Trade, Area Statistics,* Table 3. Volumes for each state are available separately.

[3] It would be more desirable to use the number of registered vehicles (by county) instead of total population; however, reasonable results are possible with population totals and they are more easily obtained.

instructor). The maps should be in a form easily read and suitable for making visual correlations.

PRESENTATION OF THE ISSUE

The issue of number of service stations and any other background material may be presented to students using paragraphs one and two of this paper as a guide, along with a description of the multi-county study area. It should be pointed out that the issue can be viewed differently and that persons using the same data can arrive at different conclusions. Then students should be divided into four groups having these roles: the typical motorist or consumer of gasoline concerned with convenient and low cost service; the marketing director for a major oil company concerned with profit margins; the state director for the Office of Emergency Preparedness concerned with gasoline storage, supply, and distribution; and the elected county executive officer concerned with county economic health and tax revenues. The students in each group should use the census data and maps as evidence to support their group's position on the issue.

The stage is then set for a discussion of how the census collects its data and introduction of the raw county data on gasoline service station establishments as it appears in the retail trade volume of the census. The raw data should spark discussion and speculation about the counties with extremely high or low values, and this in turn should lead to a recognition of the necessity for grouping data and for comparative contexts such as per capita ratios.

DATA EVALUATION

Student discussion and utilization of data must develop certain key aspects about data definitions and assumptions. Like most other data, census materials embody a bevy of assumptions about the data unit itself (the gasoline service station establishment), the geographic unit (county), and the time unit (date on which the data were collected). Turning first to the definition of "establishment", a quick mental traverse along a familiar urban thoroughfare and a major highway will suggest that service stations are not at all equal in what they are producing or offering to the public. Some stations sell primarily gasoline, while others deal mostly in automotive accessories, and some primarily sell repair services. Also, some stations operate as part of a department store or food market, although most operate independently.

Establishments also differ in the nature of their market and sales characteristics. Again, a mental traverse of a thoroughfare will suggest service stations primarily catering to through traffic as opposed to local residential or commercial traffic. Rural county service stations may have a major market in agricultural vehicles while other stations are "truck stops". All of these stations may vary in their service and price competition. Census data on the number of service station establishments and their volume of sales mask these differences.

Another key concern is the geographical data unit, in this case the county. Census data treat the county as internally homogeneous with all locations equal in access and population characteristics. A single county may include locations on rural, urban, interstate, and mass transit networks. Automobile ownership and use vary with level of income, age groups, availability of mass transit options, as well as population distribution. Most counties are not internally homogeneous and metropolitan counties may be extremely complex.

The date represented by the data is also a key concern. Does the census year fairly represent conditions of adjacent years and serve as a basis for making inferences? Uses of the census year, like the county unit and the establishment unit, require assumptions which should be explicit in the minds of the students.

DATA PREPARATION

The objective of developing skills in the use of comparative frameworks can be met within the role groups as they assess raw census data, and as they realize the need to compensate for the inequities of county units and to group data for ease of comprehension and mapping. This affords the instructor an appropriate opportunity to present conceptually the alternative techniques of data grouping as suitable to the level of the class. The application of grouping techniques is probably well served by the convenience of the simple technique of grouping into quintiles. These are easily mapped and understood. Each group should prepare its maps in this manner.

ANALYSIS AND PRESENTATION

Each role group must first describe the map patterns and then visually correlate these patterns to each other and to the state highway map and the population distribution map. Students especially need to check these maps with their personal knowledge of the study area. The map patterns should suggest hypotheses to

be considered and examples which can serve as evidence to fully or partially support or refute the assertion that there are too many gasoline service stations. Within each role group students will probably encounter confounding evidence, a situation which may suggest that counties located astride the interstate highway network need to be examined separately, as do rural low-density population counties, metropolitan counties, and popular tourist counties. Time constraints will determine how far this thinking can be developed. From this analysis each group should amass and order its evidence according to variations in the economic and demographic conditions found within the study area.

Presentations to the class by each role group should be carefully prepared and accompanied by maps or handouts easily readable by the entire class. The preparations should include: a clear definition of the role being represented, a clear statement of position on the issue, the chain of reasoning supporting the position taken, citation of evidence and its limitations, and finally, comments on additional information which would be desirable for a more complete evaluation and presentation. Discussion during each presentation should be channeled toward the quality and use of evidence in supporting the reasoning used. At the conclusion of the role group presentations there should be a group evaluation of the census material, the use of ratios, and the problems of alternate interpretations of data. This final discussion might point again to the three areas of concern to the geographer mentioned earlier.

THE EXAMPLE OF GEORGIA

The state of Georgia with 159 counties has more county units than necessary for the project, for a smaller number of counties would have made data preparation less time consuming. However, Georgia includes agricultural counties, mountain and recreation counties, ten metropolitan counties, and one-third of the counties are traversed by the interstate highway system. To accommodate the two class periods scheduled, county data were prepared in tabular form and mapped on county outline maps. Each person was given a packet containing a blank county outline map giving county names; a state highway map (Fig. 17-1); quintile maps for number of persons per gasoline service station (Fig. 17-2), volume of sales per gasoline service station (Fig. 17-3), gasoline service station sales per capita (Fig. 17-4), relative importance of gasoline service station sales to total retail sales (Fig. 17-5). Each role group was given a plastic overlay showing interstate and divided highways and had access to the tabulated data.

Figure 17-1.

Session one introduced the project by discussing the Census of Business and its data limitations. This was followed by a brief comment on the arbitrary selection of quintiles for data grouping and then by the organization of the role playing groups. The groups were given a week to meet outside class to develop their presentations. The second class period was devoted to group presentations and evaluative discussion which actually ran over into part of a third class period.

Presentations by the role groups showed several common traits. Within each role group there was at least one person who was able to cite evidence in support of a minority position on the issue. Frequently, there was a tendency to place too much faith in the data, resulting in an uncritical acceptance of data assumptions. In addition, when appraising the data, the role groups tended to under-value or ignore their personal experience. However, each

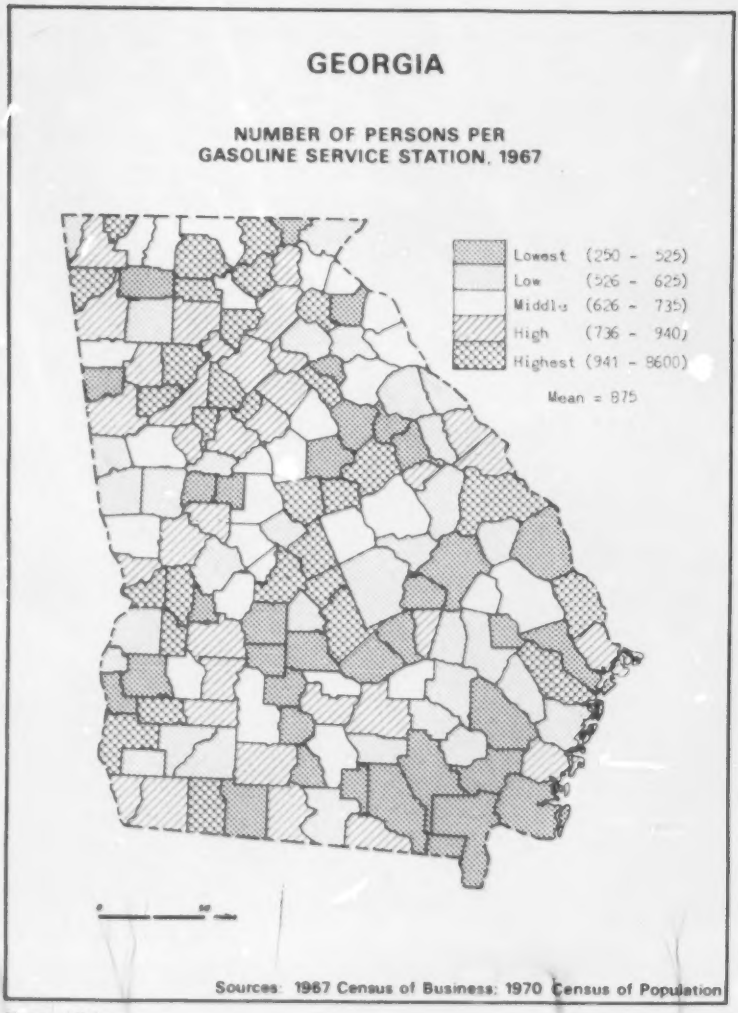
GEORGIA
NUMBER OF PERSONS PER
GASOLINE SERVICE STATION, 1967
Lowest (250 - 525)
Low (526 - 625)
Middle (626 - 735)
High (736 - 940)
Highest (941 - 8600)
Mean = 875
Sources: 1967 Census of Business; 1970 Census of Population

Figure 17-2.

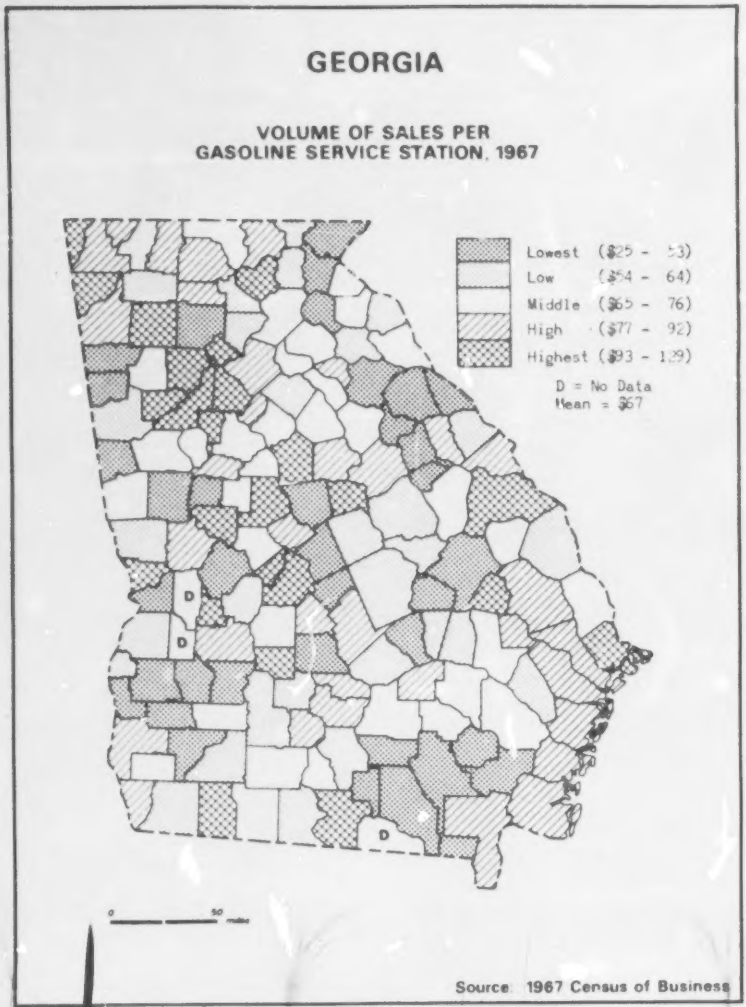
GEORGIA
VOLUME OF SALES PER
GASOLINE SERVICE STATION, 1967
Lowest ($25 - 53)
Low ($54 - 64)
Middle ($65 - 76)
High ($77 - 92)
Highest ($93 - 139)
D = No Data
Mean = $67
D
D
D
0
50
Source: 1967 Census of Business

Figure 17-3.

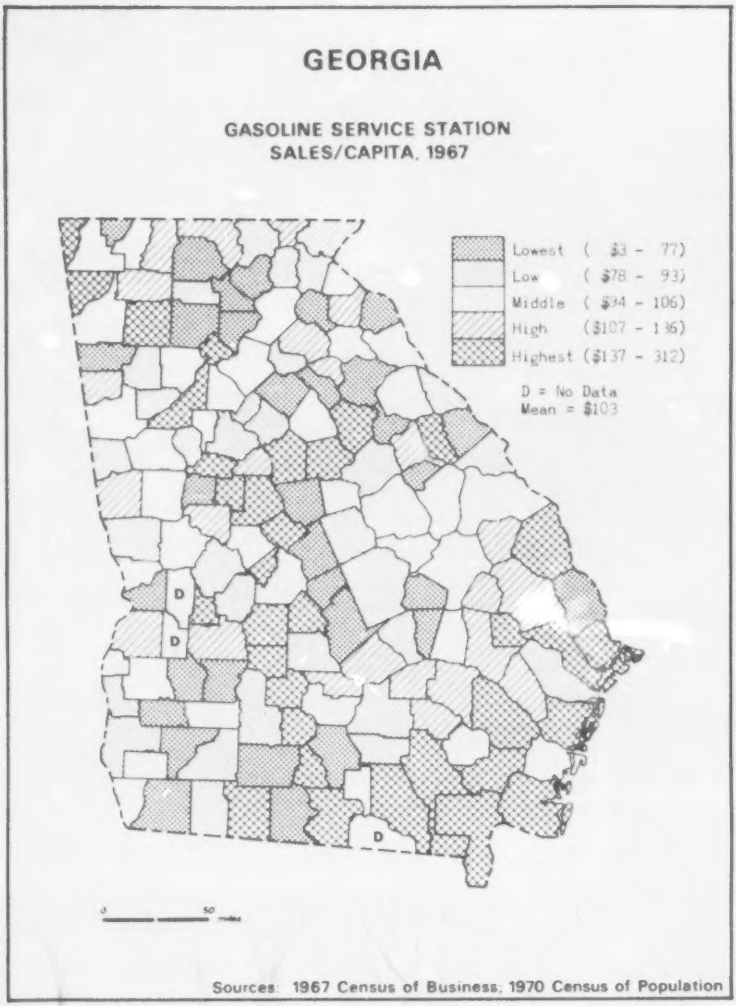
GEORGIA
GASOLINE SERVICE STATION
SALES/CAPITA, 1967
Lowest ($3 - 77)
Low ($78 - 93)
Middle ($94 - 106)
High ($107 - 136)
Highest ($137 - 312)
D = No Data
Mean = $103
D
D
D
0
50
Sources: 1967 Census of Business; 1970 Census of Population

Figure 17-4.

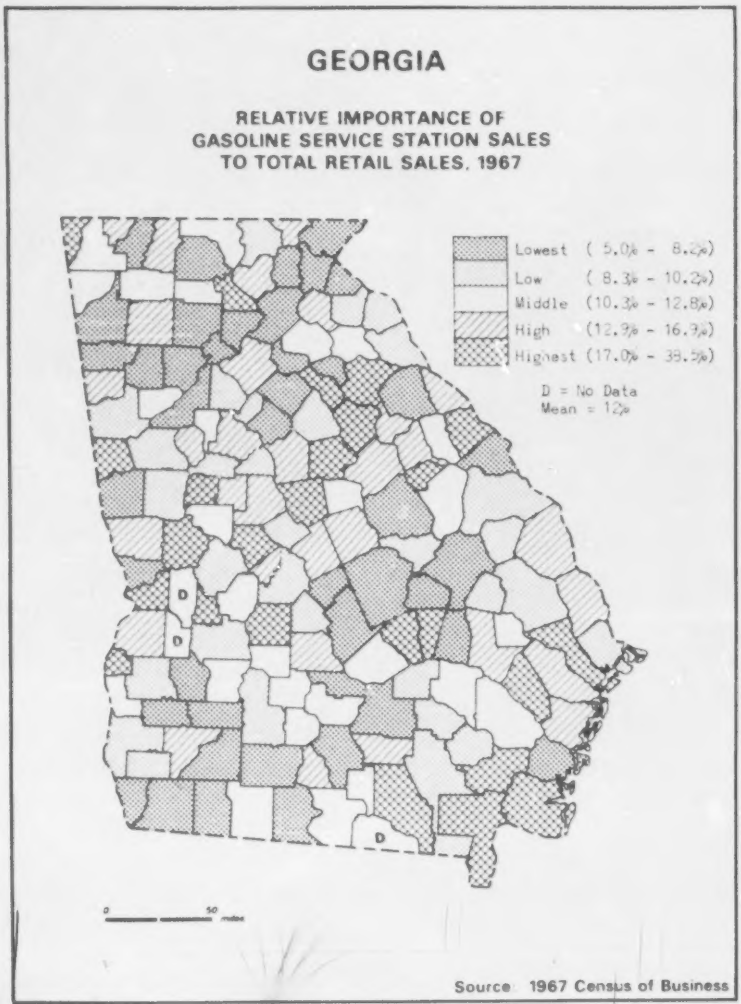
GEORGIA
RELATIVE IMPORTANCE OF
GASOLINE SERVICE STATION SALES
TO TOTAL RETAIL SALES, 1967
Lowest (5.0% - 8.2%)
Low (8.3% - 10.2%)
Middle (10.3% - 12.8%)
High (12.9% - 16.3%)
Highest (17.0% - 38.5%)
D = No Data
Mean = 12%
D
D
D
0
50
Source: 1967 Census of Business

Figure 17-5.

group did recognize a need for additional study of intra-county conditions before a strong defensible position could be assumed on the issue.

The motorist role group generally disagreed with the assertion that there were too many service stations, using as their evidence the number of persons per station (Fig. 17-2), and the volume of sales per station (Fig. 17-3). In the case of the twenty-eight counties with high ratios on both maps (largely in the northern mountains and metropolitan counties) it was argued that there might be a need for more stations. In the case of thirty-six counties with low ratios on both maps (largely in the southeastern one-third of the state), it was argued that there may be a surplus of stations in some counties, but decreasing the number of service stations would increase consumer travel to the remaining stations.

The role group representing the marketing director agreed with the statement especially in so far as it applied to the rural areas of the state. Volume of sales per service station and volume of sales per capita (Fig. 17-4) were used as indicators. Where the ratio of sales per station was low and the ratio of sales per capita were both low, it was taken to indicate a county with too many service stations, but this was found in only eleven counties. Counties with the highest volume of sales per station were considered candidates for additional stations.

The elected official group utilized sales per capita as an indicator of motor fuel tax revenues generated per person and the relative importance of gasoline service station sales to total retail sales (Fig. 17-5) as an indicator of economic health. Different types of county locations were selected as examples to illustrate alternate positions on the issue.

The emergency preparedness role group did not agree with the assertion and used as their evidence the number of persons per station and the distribution of establishments across the state. The high ratio of persons per service station characteristic of the metropolitan counties was cited as an indicator of inadequate storage capacity to meet a gasoline shortage. The maintenance of a number of service stations in rural areas was cited as desirable for ensuring emergency storage capacity in the state.

In the evaluative discussion at the end of the presentations, several groups of counties were noted for their similarity of characteristics; these were the rural southeastern one-third of the state, the metropolitan area counties, the non-metropolitan interstate highway counties, and especially those located on I-75 south of Atlanta, and the mountain counties of northern Georgia. In addition, consideration was given to the role of major land use

types such as three military reservations, national parks and forests, the seashore recreation counties of the southeast, and the Okefenokee Swamp. Students indicated a desire to pursue the question on an individual county basis for selected types of counties.

SUGGESTIONS FOR TEACHERS

Various modifications and alternatives might yield an application of the Census of Business more appropriate to a given course. The gasoline service station topic could be modified by a different selection of roles, by the addition of county data for motor fuel tax receipts or motor vehicle registrations, or the comparison of 1968 data with 1972. Related projects might include mapping and describing a nearby thoroughfare in terms of the number, type, and location of service stations, interviewing a service station operator, or selecting and investigating a single major oil company's marketing organization. Perhaps the same project design could focus upon census data for motels or food stores. Yet another alternative would be to utilize census data on major retail centers in standard metropolitan statistical areas.

Regardless of the project design or topic selected, utilization of the Census of Business demands an explicit and detailed critique of the assumptions and limitations of the data. In every case this means reviewing data collection procedures of the census, defining of the business or establishment unit, evaluating the implications of the scale of geographic unit such as the county, and establishing the time context of the data. Frequently, projects based on the Census of Business are greatly enhanced by supplemental activities that consider place as an end in itself and draw heavily on personal experience.

18

Mineral Resource Data for Geographic Research and Instruction

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It is generally recognized that mineral resources are the basis of modern civilization, in that virtually every activity involves the use of mineral products, products made by machines made of minerals, or power generated by mineral fuels. Geographers are among those keenly aware of the increasing number and quantity of minerals being consumed, of the present or impending shortages of many key minerals, and of the environmental consequences of increased mineral extraction. Because both meaningful classroom instruction and scholarly research on these topics are dependent upon good data, it is appropriate to examine the nature and utility of the major sources of mineral data.

MINERAL DATA SOURCES

Mineral resource data are available from a wide array of sources, including corporations, industry organizations, trade publications, and county, state, and national governments.[1] This discussion is concerned with two major data sources, the U.S. Bureau of Mines and the U.S. Bureau of the Census. Specifically, focus is on the Census of Mineral Industries and the *Minerals Yearbook*.

CENSUS OF MINERAL INDUSTRIES

The first Census of Mineral Industries was conducted for the year 1840. Subsequent coverage has been at irregular intervals (1850, 1860, 1870, 1880, 1889, 1902, 1909, 1919, 1929, 1935,

[1] For example, *International Coal Trade*, *International Petroleum Annual*, and *Mineral Trade Notes* are published by the U.S. Bureau of Mines. The National Coal Association, the American Petroleum Institute, and the American Iron and Steel Institute are among those organizations publishing data for their respective industries.

1939, 1954, 1958, 1963, 1967, and 1972). Current plans call for a mineral industries census to be conducted covering years ending in "2" and "7". After the census is conducted, data processing results in a delay of publication by approximately eighteen to thirty months, limiting its utility as a source of current information. Data are published through a number of reports in three series which organize data by subject, industry, and area.

The number of reports in the Subject Series varies from census to census, but typically includes such topics as type of operation, size of establishment, and water use in mining. Data coverage includes geographic divisions and states, with two-digit and some four-digit Standard Industrial Classification (SIC) industrial coverage.

Industry Series reports provide data for an industry or industry group. In the 1967 Census, for example, fourteen reports were published, providing data for fifty-three mineral industries and ten subindustries. Figures are provided for such industry characteristics as number of establishments, employment, payrolls, value added in mining, and quantity and value of product shipped. Some data are broken down by type of operation and by geographic region, with state coverage in some instances.

Forty-eight individual state reports and one combining Maryland, Delaware, and the District of Columbia comprise the Area Series. Data are provided for the mining industries present in a particular state, including type of operation, number of establishments, value of shipments, value added by mining, and others. Some county data are available, although the general lack of complete county data is a disadvantage.

MINERALS YEARBOOK

The *Minerals Yearbook* is an annual publication of the U.S. Bureau of Mines, the agency charged with providing economic and statistical studies of domestic and foreign mineral production, distribution, and consumption. The *Yearbook* originated in 1866, with the publication of a volume entitled *Mineral Resources of the United States*, providing data primarily on gold and silver production. Subsequent volumes were published (until 1931), with some gaps and, for some periods, on a biannual basis. Fairly comprehensive commodity coverage was provided commencing with the 1882 volume. In 1932 the name was changed to *Minerals Yearbook*. Publication as a single volume continued until 1952, when the format was expanded to three volumes. In 1963 another expansion enlarged the format to four volumes.

Volume I, *Metals and Minerals,* and Volume II, *Mineral Fuels* are bound and issued together as a single publication. These volumes include chapters dealing with metal, nonmetal, and mineral fuel commodities, as well as a statistical summary, a review chapter, and chapters on technological trends, and employment and injury in the mineral industries. Each mineral commodity chapter includes both text and statistical information. Data categories vary among the more than seventy-five commodity chapters, but commonly include domestic production by volume and/or value, imports, exports, stocks, comsumption, and world production. These and other characteristics are expanded and elaborated upon within the chapters, the extent varying with the commodity. In most instances, areal coverage is provided for states as well as nations.

Volume III, *Area Reports: Domestic* contains chapters on every state, U.S. possessions in the Pacific Ocean and the Caribbean Sea, Puerto Rico, and the Canal Zone. Each chapter contains quantity and value data and text on the production of metals, nonmetals, and mineral fuels. Value of production and ranking of major minerals by county are included, as are listings of major producing firms. Text material indicates recent changes and developments including references to individual firms or sites.

The mineral statistics of over 130 foreign countries and areas are covered in Volume IV, *Area Reports: International.* This volume, the most recent addition to the *Yearbook,* summarizes the mineral industry of major producing countries with over seventy-five individual chapters devoted to major nations, and a number of chapters summarizing minor nations and areas. Each chapter provides production, import, and export data for major minerals, as well as other salient statistics of particularly important mineral industries (e.g., the iron and steel industry, coal industry, or crude petroleum production in these nations where important).

As in the case of the Census of Mineral Industries, a delay of several years occurs between the date of canvassing and the date of final publication of the *Minerals Yearbook.* Individual chapters are completed well in advance of the final *Yearbook,* however, and are published as *Preprints.* Even more current data, although considerably less detailed, may be obtained from various *Mineral Industry Surveys.* These provide area and industry data, with some *Surveys* being published weekly, and others monthly, quarterly, and annually.

CONTRASTS AND COMPARISONS

The *Census of Mineral Industries* and the *Minerals Yearbook*

are distinct from one another, even though they share some common traits. Although both are valuable data sources, most users will find greatest utility in the *Yearbook* because the annual publication schedule and advance data releases provide more current data. The *Census of Mineral Industries* is perhaps internally more consistent in use of data categories, but does not provide certain data of interest to geographers (e.g., imports, exports, and market destinations) and is not as convenient for a casual user.

The regulations related to confidentiality prohibit publication of data disclosing information provided by individual companies. Consequently, when only one or two firms produce in a county, data for several counties or industries may be agglomerated. Thus, complete coverage on a county basis is not usually available. The Census, in particular, loses some utility for the geographer due to agglomeration in both industrial and areal data.

COMMENTS ON DATA USE

The most effective use of any published data source, such as the *Census of Mineral Industries* or *Minerals Yearbook*, requires an appreciation of what is being recorded, how it is obtained, and with what data limitations and implications. The following comments are intended to alert the user and to promote more satisfactory mineral data use.

DATA INTENT

When employing published mineral data, one should determine what has been measured, and in what manner. For example, anyone seeking data on value or volume of production of a specific mineral in a particular county or state would need to know if production volumes reflect ore mined or mineral content, or if values were determined at the mine, mill, or some other site. Similarly one would need to know whether reserve figures assume full recovery, 50 percent recovery, or some other amount, and whether they reflect proven reserves or estimates.

DATA UNIT

A related problem is reflected in the unit of measure, which commonly varies among mineral commodities. For example, iron ore is commonly measured in long tons (2,240 pounds), copper in short tons (2,000 pounds), and some foreign production figures are given in metric tons (2,204.62 pounds). Petroleum and petroleum products are measured both in short tons and barrels of 42

gallons, cement in 376 pound barrels, and mercury in 76 pound flasks. Silver and gold are measured in troy ounces and gem stones and industrial diamonds in carats. Care must be taken not to mistake or confuse units, particularly when dealing with a variety of minerals, when comparing foreign to domestic production, or when tracing data over a time span during which data may have been recorded in more than one unit.

DATA COMPLETENESS

Because of differences in objectives, method of canvassing, and point of measurement, inconsistencies occur among the Census of Mineral Industries, *Minerals Yearbook*, industrial, and state data. Thus, *Census* and *Yearbook* data are closely comparable in some instances, and widely disparate in others. In 1967, for example, the Bureau of Mines recorded total United States sand and gravel production at 905 million tons, whereas the *Census*, which excludes production by federal, state, and local governments, recorded 620 million tons. Unfortunately, some uncertainty exists as to the comprehensiveness of even the Bureau of Mines data published in the *Yearbook*, which is certainly the single most reliable mineral data source. For example, Gray suggests that recent Bureau of Mines data on sand and gravel production in Oregon may include less than 50 percent of actual production volumes.[2]

DATA BIAS

Bias may enter the data due to the nature of the mix of activity in mineral production in a given year. Sand and gravel production figures may vary widely in a region from year to year, for example, depending upon the nature and extent of construction activity that year. Also, the skill and interests of the author of the chapter or report may to some degree be a source of bias.

Finally, the user of mineral data is cautioned against a "mind set" determined by the data. Using data categories in published data sources may tend to stimulate inquiry in some directions more than others. For example, categorization of chrome, manganese and bauxite as metals may result in their use also as nonmetallics not being full recognized. Similarly, categorization of petroleum as a fuel may be prejudicial against consideration of its nonfuel role. Additionally, with a category such as metals or mineral fuels there may be significant variation among individual

[2] Jerry J. Gray, *A Statistical Study of the Mined Land Reclamation Act* (unpublished working paper of the Department of Geology and Mineral Industries, Albany, Oregon, 1972).

minerals in corporate structure, marketing procedures, and other important characteristics. Neither the determination of questions nor derivation of possible answers should be restricted by format or arrangement of data in these sources.

SUGGESTED READINGS

The following selection of titles provides a variety of examples of the use of data available in the *Census of Mineral Industries, Minerals Yearbook*, and related sources. Review of the current geographic literature will provide additional illustrations.

Deasy, George F., and Griess, Phyllis R. "Local and Regional Differences in Long Term Bituminous Coal Production Prospects in Eastern United States," *Annals*, Association of American Geographers, Vol. 57 (1967), pp. 519-533.

Earney, Fillmore, C. F. "New Ores for Old Furnaces: Pelletized Iron," *Annals*, Association of American Geographers, Vol. 59 (1969), pp. 512-534.

Fisher, W. L. "The Nonmetallic Industrial Minerals: Examples of Diversity and Quantity," *Mining Congress Journal*, (February, 1969), pp. 120-126.

King, L., Casetti, E., Odland, J., and Semple, K. "Optimal Transportation Patterns of Coal in the Great Lakes Region," *Economic Geography*, Vol. 47 (1971), pp. 401-413.

Maresh, Thomas J. "Factors Contributing to Regional Variation in U.S. Coal Production," *Yearbook*, Association of Pacific Coast Geographers, Vol. 33 (1971), pp. 141-152.

_____. "On Constancy and Change in the Distribution of Mineral Production," *Land Economics*, Vol. 48 (1972), pp. 179-183.

_____. "Relative Localization of Mineral Production," *Mining Congress Journal*, (August, 197), pp. 53-57.

Mason, Peter Frank. "Some Changes in Domestic Iron Mining as a Result of Pelletization," *Annals*, Association of American Geographers, Vol. 59 (1969), pp. 535-551.

Miller, E. Willard, "Changing Patterns in the Mineral Economy of the United States, 1939-1954," *The Professional Geographer*, Vol. XIII (May, 1961), pp. 1-6.

19

Geographical Trends in the Coal Industry
A Classroom Analysis

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INTRODUCTION

When "clean air standards" were promulgated, many utility companies, as major consumers of coal, were forced to shift from using the high-sulfur coals of Appalachia to natural gas and oil. Even before the Arab Oil Embargo, however, the utilities recognized the need for alternative coal supplies. Hence, major coal companies looked especially to low-sulfur subbituminous coal deposits and lignite deposits in the Great Plains. The coal in this area is especially attractive because of the vastness of the deposits and their suitability for strip-mining, including the factor of nearness to the surface. In addtion, a strip-mining operation produces three times the output per man-hour of an underground mine (noted in National Coal Association, *Bituminous Coal Facts, 1972).* In view of rising labor costs, the greater output per man-hour favors strip-mining. Thus, a locational shift from the less easily mined, higher-sulfur coal fields of the eastern fields is under way.

Understanding the interrelationships of growth, resource utilization, locational shifts, and the forces creating changes is a major objective of this unit. To give focus to these trends, especially the relationships of energy and environmental considerations to the extraction of coal, locational changes in the bituminous coal and lignite industry at national and regional levels will be studied. Focus is needed because of the complexity of variables. The coal industry is a good barometer of the demands for energy and the shifts brought about by environmental policy and fuel shortages.

The materials are suitable for secondary and college level geography courses. The unit has been prepared with sufficient

structure to guide the teacher, but enough flexibility to allow each to change it to suit a selected regional emphasis.

RATIONALE

Formal education should produce a citizenry that is knowledgeable and concerned about present environmental dilemmas. Citizens will be required to make decisions between higher fuel costs and a restored landscape or lower costs and a scarred landscape; between community traditions and dislocation of its members, their homes, and lifestyles. These are only two out of many examples of value conflict in our society. It appears evident that our ability to understand interconnecting relationships among food, population, resources, and pollution has not kept pace with our technological ability to develop and use new materials and substances.

Learning or teaching about environmentally-related topics means directly confronting issues, events, and places; not just learning or teaching about issues, events, and places. The study of issues should be related to the real world. Ideally, students should get a chance to see, touch, and smell coal in the mines, to see coal being mined, and to meet people whose lives are being affected by forces beyond their individual control. When teachers' efforts are directed toward such experiences, vicariously or first hand, conflicts of values are brought within intelligible grasp of students. Efforts to achieve these objectives are often frustrated by limited opportunities for field work and a lack of supplementary materials involving both cognative and affective elements.

The following four lessons on *Changes in the Location of the Bituminous Coal and Lignite Industry* are designed to meet the need for supplementary materials. These lessons focus on changes in national coal producing areas, regional sites, and the interrelationship within and between those changes. Through readings students will get a feel for the time-space dimension of the economic, political, social, and environmental forces shaping change in the coal industry, and for the conflicts of values such change engenders in people's lives.

STRUCTURE

No answers to questions raised by the lessons are given in the materials that follow; quite possibly the Bibliography in the Appendix is inadequate to supply all the information needed for students to answer the questions they raise. However, the lessons

provide approaches to analysis of the present situation. It is a dilemma influenced by living standards oriented to ample and cheap energy sources, and by a national policy, ill-equipped to respond to sudden energy shortages.

In Lesson I the teacher introduces the unit, gives students state data on the bituminous coal and lignite industry, and shows way of mapping the data. This exercise, along with a discussion of maps constructed from it, will help students understand *national trends* and formulate questions as to why changes are occurring. Readings from the Bibliography (readily available to the student) will suggest reasons for geographical changes in the coal industry.

Students select a state or group of states in Lesson II and study changes in the coal industry using the county as the data base. This provides one way to study *local trends*. The *1972 Census of Mineral Industries, Area Reports*, published in March, 1974, is used along with the U.S. Bureau of Mines *Minerals Yearbook*. Although there are twenty-five coal producing states, only ten are reported having sufficient county information for this study. Students may select one or more of these states: Alabama, Colorado, Illinois, Indiana, Kentucky, North Dakota, Tennessee, Utah, West Virginia, and Wyoming. Students will be looking at changes in total coal production in 1967 and 1972; total coal production per numbers employed in mining in 1967 and 1972; tons of coal strip-mined per total coal production; and the tons of coal underground-mined per total coal production. The latter two variables can be studied as possibly indicating trends in production patterns within the industry. Questions contrasting what these data mean to the coal miner and what they mean to power companies should arise out of the analysis.

An opportunity for students to integrate what they have learned about national and local changes in the coal industry is provided in Lesson III. Students need guidance while sharing their readings and questions so that they do not apply what they learn about the national scale to the local area, nor apply what they learn about this one coal region to every coal region. Hopefully, students will appreciate from their readings and study the feelings of frustration felt by landowners, tenants, power company executives, coal company people, and conservation groups as they seek to establish priorities to protect individual and group rights, in addition to protecting the social and physical environment.

Lesson IV provides the means for students to use their new skills, understandings, and feelings, in a game/simulation activity. They will select a site in their study region and decide on a possible conflict situation arising out of either the energy crisis, deple-

tion of coal resources, or deterioration of the local landscape. Lesson IV is an evaluation activity. The gaming/simulating activity of the lesson is a way to determine whether students have integrated the factors of a local energy issue in the context of society's demands which the community is frequently unable to control.

UNIT OBJECTIVES

The general objectives are: (1) to involve students in using actual data from the *Census of Mineral Industries Area Reports*, and the *Minerals Yearbook*, (2) to have students map data and to recognize spatial patterns and trends, (3) to develop a sense of time-space perspective in recognizing variations and similarities between national and regional trends, (4) to develop an understanding of socio-economic factors responsible for changes in the coal industry which, in turn, affect the site and situation of the local community and represent conflict of values in our nation, and (5) to reflect on the interrelationships of growth in food demands, population, resource utilization, industry, and pollution.

In order to attain these objectives, each student will have an opportunity to:

1. Work productively in small groups
2. Define site and situation problems by using mapping
3. Use maps as an aid in analyzing changes in the coal industry
4. Select appropriate readings to answer questions generated in map analysis
5. Delineate a special interest area and produce and participate in a game/simulation activity that incorporates both information learned and the conflicts of values involved

TEACHING STRATEGY

The four lessons are discussed below with suggestions for preparing and carrying out the exercises with students.

LESSON I: GEOGRAPHICAL CHANGES IN THE BITUMINOUS COAL AND LIGNITE INDUSTRY AT THE NATIONAL LEVEL

Objectives

Among the objectives in Lesson I are the following:

1. To stimulate students' awareness of the magnitude of information contained in tables
2. To develop students' ability to map data

3. To have students work in teams so that they can share information, challenge illogical suppositions, and discover inferences from their data
4. To stimulate students' understanding of the forces at work within society that are creating change, and to find answers to questions

Materials Needed

One copy of each of the following should be distributed per student: (1) outline map of the United States; (2) "Origin and Types of Coal in the United States;" (3) Table 19-1: Bituminous and Lignite Production in the United States by State, 1967 and 1972; (4) "Procedures for Mapping"; (5) Table 19-2: Classes to be Used for Mapping; (6) "Bibliography." (See Appendix: Teaching Materials)

Teacher Guidelines

Lesson I, First Class Period

1. Call to the students' attention reasons for studying changes in the bituminous coal industry as an indication of change in energy policy that affects all of our lives (See Introduction and Rationale).
2. Have students study the "Procedures for Mapping" and relate these methods to the method selected in "Classes to be Used for Mapping." Be certain that students understand the mapping procedure before beginning the exercise.
3. Divide students into four working groups. In Group I, some members will map Total Coal Production in 1967, and others Total Coal Production in 1972. Group II has some members mapping Percentage of Coal Production Underground-mined, 1967, and others, 1972. Group III has some members mapping Percentage of Coal Production Strip-mined, 1967, and others, 1972. The remaining students form a group to map Total Estimated Coal Reserves, 1972.

Lesson I, Second Class Period

1. Using the original group structure, assign the task of identifying patterns of change in their maps, recording questions asked, and listing information needed to answer the questions.

2. Reorganize students into four different groups, making certain that each of the seven maps is represented.
3. Assign students the task of identifying similarities and differences displayed on the maps (in terms of changing time-space patterns). Then students should suggest hypotheses from data, relationships among factors, and raise questions about national trends. Finally, they should record observations, questions raised, and the information needed to answer questions regarding national trends.
4. Assign a number of students to each of the readings in the Bibliography in preparation for further discussion. If the teacher wishes, summary statements regarding each reading may be prepared over the next several classes.

LESSON II: GEOGRAPHICAL CHANGES IN THE BITUMINOUS COAL AND LIGNITE INDUSTRY AT THE REGIONAL LEVEL

Objectives

Among the additional objectives in Lesson II are the following:

1. To identify regional changes in the bituminous coal and lignite industry
2. To describe the effect of changing patterns on the shape, size, and lifestyle of nearby communities
3. To understand how a local site and situation is affected by forces beyond the control of the community, such as changing technology

Materials Needed

The following materials are needed for this lesson: (1) "Teacher Directions for the Use of *Minerals Yearbook* and the *Census of Mineral Industries: Area Reports*", (2) Transparency made from Table 19-3: Data for Transparency, excerpts from *Minerals Yearbook* and Census of Mineral Industries: *Area Reports;* (3) several copies of *Minerals Yearbook* and *Census of Mineral Industries: Area Reports* (Option: one copy per student of Table 19-4; see also Table 19-1); (4) one copy per student, Table 19-5; (5) one copy per student, Table 19-6; (6) one copy per student of state(s) map(s) copied from *Census of Mineral Industries: Area Reports;* (7) class copies of "Procedures for Mapping" used in Lesson I.

Teacher Guidelines

Lesson II, First Class Period

1. The class should select a state or states from this list to study changes in the location of bituminous and lignite coal operations by county: Alabama, Colorado, Illinois, Indiana, Kentucky, North Dakota, Tennessee, Utah, West Virginia, and Wyoming.
2. Present use of data sources by projecting the transparency and giving explanations based on "Teacher Directions."
3. Group students to construct Chart I for the selected area: (a) Total Coal Production (1000's of short tons), 1967 and 1972; (b) Tons of Coal Strip-mined, 1967 and 1972; (c) Tons of Coal Underground-mined, 1967 and 1972 (data for a, b, and c to come from *Minerals Yearbook);* (d) Total Employment in Mining, 1967 and 1972 (data for d to come from *Census of Mineral Industries: Area Reports).* The size of the group depends on the number of counties in the state(s). A beginning example for Chart I is included with student material as Table 19-4.
4. Use student tables to construct a composite Chart I, and use this information to make Chart II which deals with ratios. Compute Chart II with (a) Total Coal Production (1000's of short tons), 1967 and 1972; (b) Total Coal Production per Employment in Mining, 1967 and 1972; (c) Tons of Coal Strip-mined per Total Coal Production, 1967 and 1972; (d) Tons of Coal Underground-mined per Total Coal Production, 1967 and 1972. Those from (b) through (d) are ratios and will need to be calculated. Note: If employment in mining data are listed as categories (e.g. 100-499 persons), select the mid-point of the category, that is, 300 as the denominator. Employment data are missing from some counties in the *Census.* This can be indicated on Chart II with N.G. (not given). List counties vertically, and ratios horizontally. Reproduce Chart II for the class.

   Note: The teacher has the option to provide 4 or have the class compute ratios in an additional class period. The assumption here will be that the teacher is calculating ratios and constructing the composite chart.

Lesson II, Second Class Period

1. Select mapping procedure appropriate for data and make Chart III: Classes for Data. Refer to Lesson I, "Procedures for

Mapping" and "Classes to be Used for Mapping." Note that five classes are suggested for consistency. Furthermore, the ranges for each class of data in 1967 and 1972 must be the same or the changes at the county level will not be evident. A beginning example for Chart II is Table 19-6: Alabama, Classes for Data.

2. Distribute copies of state(s) map(s) by county taken from the *Census of Mineral Industries: Area Reports.*
3. Discuss mapping methods as before and explain procedure students are to use in producing the eight maps, one for each data column in Chart III.

Lesson II, Third Class Period

1. Group students in order to study four variables for both 1967 and 1972, as shown in Chart II and on the maps.
2. Have students identify spatial patterns and note relationships between 1967 and 1972, and have students record questions asked and information they would need to know to answer questions.
3. Regroup students, each with a different map, and assign them the task of identifying similarities and differences on the maps to formulate hypotheses about geographical trends among the four variables. Have students record what they discovered, hypotheses formulated, and information they would need to know to answer the questions regarding regional trends. How do regional time-space patterns relate to national trends?

LESSON III: SYNTHESIS

Objectives

1. To relate learnings in Lessons I and II by comparing and contrasting regional and national trends in the bituminous coal and lignite industry.
2. To share insights from readings which attempt to answer questions explaining the *why*, *how*, and *effect* or *changes/trends* at the regional and national level.
3. To develop skills in generalizing

Materials Needed

Six sets of fifteen maps from Lessons I and II.

Teacher Guidelines

1. Divide the class into groups, each with a set of fifteen maps, and appoint a recorder for major ideas from each group.
2. Have students compare and contrast trends at the national and local levels by discussing questions from Lessons I and II and summaries of readings from the Bibliography.
3. Allow each reporter reasonable time to share ideas/answers with the class.

LESSON IV: INTERRELATIONSHIPS AND IMPLICATIONS OF CHANGES IN THE BITUMINOUS COAL AND LIGNITE INDUSTRY: ACTIVITY

Objectives

1. To let students demonstrate their awareness of conflicting attitudes toward energy, coal, and the environment in constructing a game/simulation activity
2. To let students demonstrate, in a behavioral setting, the art of compromise as they deal with issues and facts while executing the game/simulation activity
3. To provide a situation for students to enter into roles that reflect feelings and values that may or may not conform to those of their own, yet help the students to get to know themselves better
4. To provide the teacher a way of evaluating both cognitive and affective learning students attained from this unit.

Materials Needed

One copy for teacher of "Directions for a Game/Simulation Activity."

Teacher Guidelines

Lesson IV, First and Second Class Periods

1. Present the idea of a game/simulation activity to students, using directions given with the lesson. The time spent on this will depend upon student familiarity with games, role playing, and/or simulation.
2. Hold class discussion to select a site and situation from their regional study that involves a conflict in the community arising out of either the energy crisis, a depletion of coal reserves, a deterioration of the local environment, or a conflict in the

needs, values, and wants within the community and/or the society as a whole.

3. Have students state the conflict in precise terms, e.g., energy crisis: conflict over water rights of the Green River between strip-mine operators and farmers dependent on Colorado waters; determine the parties involved by job or affiliation; and describe the geographic dimensions of the conflict — locally and nationally.
4. Help students select an appropriate format for the game or role play (i.e., town meeting, court proceedings, or other).
5. Divide students into groups to write the role descriptions that reflect both the analysis of Lessons I and II and the synthesis of Lesson III. An exchange of reading summaries may be helpful along with use of maps.
6. Have students complete role descriptions as written assignments. They may want to interview coal industry personnel (either formerly or presently employed in the industry), take or borrow slides, or collect other soft data (e.g., The Procedures for Senate Committee Hearings).

Lesson IV, Third, Fourth, and Fifth Class Periods

1. Have students assume roles and carry out activity.
2. Attempt to resolve issue once pressure groups and individuals have made their facts and feelings known.

   Note: Some ambitious students become so involved that many class periods are needed to hear everyone and attempt to resolve the issue.

EVALUATING STUDENT LEARNING

Students should be evaluated by careful observation during the various lessons to ascertain their involvement. This is demonstrated through:

1. Student use of *Census* and *Yearbook* material; their understanding of classification and generalization necessary for mapping; and the quality of thought expressed in the analysis of trends and in pattern recognition.
2. Student interest in locational changes as trend indicators, subsequent readings about coal or other fuels, the energy crisis and its relationship to food problems, or pursuit of other ideas developed during the unit.
3. Student verbalization of ideas about value conflicts within our

society and the interrelationships of growth in food, population, resource utilization, industry, and pollution.

4. Student ease in groups working at common tasks, with each student accepting responsibility.

If the teacher prefers written response in addition to observation, students could be asked to write answers to variations of these questions: (a) Of the conflicts for the coal miners, which one do you think most crucial to them and their families? (b) What are some of the perceptible contrasts between trends at the regional and national level? Explain this in terms of location and the spatial aspects of social, political, and economic conditions of the area and its interconnection to the rest of the nation. (c) What sorts of conflict do you see between the values held by a coal mining community and the larger culture group of Americans? Consider the differences between needs and wants of the community and society in terms of power, food, and food products.

CONCLUSION

The bituminous coal industry provides a basic vehicle for analyzing some important issues affecting communities and society as a whole. These four lessons have potential use in classes dealing with the environment, sociology, political science, geography, or current events, although the teacher will need to modify it and adjust time and readings to the maturity and ability of the students. Through this unit of study, students will better understand that even site changes in one industry are not simple, but in reality, are complex processes involving environmental, political, social, economic, spatial, and historical considerations. How complex, indeed, is the present energy crisis with all its interlocking components!

TABLE 19-1
BITUMINOUS AND LIGNITE PRODUCTION IN THE UNITED STATES
BY STATE, 1967 AND 1972, IN MILLIONS OF SHORT TONS

	TOTAL COAL PRODUCTION		*PERCENTAGE OF COAL PRODUCTION UNDERGROUND-MINED*		*PERCENTAGE OF COAL PRODUCTION STRIP-MINED*		*TOTAL ESTIMATED COAL RESERVES*
	1967	*1972*	*1967*	*1972*	*1967*	*1972*	*1972*
Alabama	15.486	20.814	60.6	36.4	39.0[1]	63.4	15,342
Alaska	.925	.668	–	–	100	100	130,081
Arizona	.001	2.954	–	–	100	100	21,246
Arkansas	.189	.428	25.0	2.0	75.0	98.0	1,988
Colorado	5.439	5.522	65.8	55.6	34.2	44.4	80,581
Georgia	N/P	N/P	N/P	N/P	N/P	N/P	24
Illinois	65.133	65.523	42.8	48.4	57.2	51.6	139,124
Indiana	18.772	25.949	8.6	5.6	91.4	94.4	34,573
Iowa	.883	.851	33.4	41.4	66.6	58.6	6,509
Kansas	1.136	1.227	–	–	100	100	18,674
Kentucky	100.294	121.187	58.4	46.4	35.6	46.0	64,842
Maryland	1.305	1.640	33.4	8.6	66.6	87.6	1,158
Michigan	N/P	N/P	N/P	N/P	N/P	N/P	205
Missouri	3.696	4.551	8.0	–	92.0	100	31,014
Montana (B&L)	.371	8.221	5.0	0.2	95.0	99.8	221,675
New Mexico	3.463	8.248	27.8	12.2	72.2	87.8	61,423
North Dakota (lignite)	4.156	6.632	–	–	100	100	350,630

(Continued)

TABLE 19-1
BITUMINOUS AND LIGNITE PRODUCTION IN THE UNITED STATES
BY STATE, 1967 AND 1972, IN MILLIONS OF SHORT TONS

	TOTAL COAL PRODUCTION		*PERCENTAGE OF COAL PRODUCTION UNDERGROUND-MINED*		*PERCENTAGE OF COAL PRODUCTION STRIP-MINED*		*TOTAL ESTIMATED COAL RESERVES*
	1967	*1972*	*1967*	*1972*	*1967*	*1972*	*1972*
(Continued)							
Ohio	46.014	50.967	33.0	32.0	63.0	66.8	41,358
Oklahoma[2]	.823	2.624	1.0	3.4	99.0	96.6	3,281
Pennsylvania	79.412	75.939	71.0	64.6	27.6	34.6	56,759
South Dakota	.005	N/P	–	N/P	100	N/P	2,031
Tennessee	6.832	11.260	57.0	52.0	39.2	45.4	2,572
Texas (lignite)	N/P	4.054	N/P	–	N/P	100	12,872
Utah	4.175	4.802	100	99.4	–	0.6	23,721
Virginia	36.721	34.082	83.0	70.4	11.0	23.4	9,352
Washington	.059	2.634	N/A	1.2	N/A	98.8	6,174
W. Virginia	153.749	123.743	89.0	82.2	8.0	15.4	100,628
Wyoming	3.588	10.928	3.2	4.0	90.8	96.0	120,656

N/P = NO PRODUCTION
N/A = NOT AVAILABLE

[1] Percentages may not add up to 100 percent, because augar mining has not been included.
[2] The figures representing the percentage of coal strip mined in Oklahoma include the amount augar mined.

TABLE 19-2
CLASSES TO BE USED FOR MAPPING

Total Coal Production, 1967
Method D: Natural Break Points
Millions of Short Tons

greater than 100.00
45.0 – 99.9
10.0 – 44.9
1.0 – 9.9
less than 1.0

Total Coal Production, 1972
Method D: Natural Break Points
Millions of Short Tons

greater than 100.0
45.0 – 99.9
10.0 – 44.9
1.0 – 9.9
less than 1.0

Percentage of Coal Production Strip-mined, 1967
Method C: Regular Breaks

Percentage

0 – 20
21 – 40
41 – 60
61 – 80
81 – 100

Percentage of Coal Production Strip-mined, 1972
Method C: Regular Breaks

Percentage

0 – 20
21 – 40
41 – 60
61 – 80
81 – 100

Percentage of Coal Production Underground-mined, 1967
Method C: Regular Breaks

Percentage

0 – 20
21 – 40
41 – 60
61 – 80
81 – 100

Percentage of Coal Production Underground-mined, 1972
Method C: Regular Breaks

Percentage

0 – 20
21 – 40
41 – 60
61 – 80
81 – 100

Total Estimated Coal Reserves
(1,000,000's of short tons)
Method D: Natural Break Points

Millions of Short Tons

greater than 200,000
100,000 to 199,999
10,000 to 99,000
1,000 to 9,999
less than 1,000

TABLE 19-3
DATA FOR TRANSPARENCY
Example from the 1972 CENSUS OF MINERAL INDUSTRIES: AREA STATISTICS
Table 5. General Statistics by County and Industry Groups: 1967 and 1963

Code	County and Industrial Group	1967											1963	
		Establishments		All Employees		Production, development, and exploration workers			Value added in mining	Cost of supplies, etc., and purchased machinery installed	Value of shipments & receipts	Capital expenditures	All employees	Value added in mining
		Total (number)	With 20 employees or more (number)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Man-hours (millions)	Wages (million dollars)	(million dollars)	(million dollars)	(million dollars)	(million dollars)	(1,000)	(million dollars)
	Alabama, total	294	83	7.9	51.6	7.1	13.8	44.0	151.1	66.1	196.3	20.9	8.9	119.0
	Colbert County, total	5	4	.1	.5	.1	.2	.4	1.3	.7	1.9	.1	(D)	(D)
14	Nonmetallic minerals, except fuels	5	4	.1	.5	.1	.2	.4	1.3	.7	1.9	.1	(D)	(D)
	Franklin Co., total	5	2	.2	.9	.2	.4	.8	1.8	1.0	2.5	.3	.1	1.0
10	Metal mining	2	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

CC – 100-249 employees
(D) – Withheld to avoid disclosing figures for individual companies.

Example from the MINERALS YEARBOOK
Table 2. Value of mineral production in Alabama, by counties (thousands)

County	1969	1970	Minerals produced in 1970 in order of value
Autauga	$ 171	$ 171	Sand and gravel.
Baldwin	W	W	Sand and gravel, petroleum, miscellaneous clay.
Barbour	767	1,725	Bauxite, kaolin, sand and gravel.
Bibb	4,404	7,057	Coal, limestone, dolomite, sand and gravel, miscellaneous clay.
Blount	1,865	2,253	Coal, cement, fire clay, sandstone.
Calhoun	2,140	2,294	Fire clay, limestone, miscellaneous clay.
Chilton	W	W	Sand and gravel.

W – Withheld to avoid disclosing individual company confidential data.

TABLE 19-4
ALABAMA

County	*Total Production (1,000's of short ton)*		*Tons Underground-mined*	
	1967	*1972*	*1967*	*1972*
Bibb	298	898	66	0
Blout	233	260	0	0
Jackson	622	1,279	H	0
Jefferson	8,263	9,438	6,381	5,222
Marion	472	387	282	39
Shelby	570	101	561	2
Tuscaloosa	803	2,208	27	0
Walker	4,028	5,465	2,039	2,326
Cullman, Etowah, Winston	197[2]	778	0	0
TOTAL[1]	15,486	20,814[3]	9,362	7,588

[1] Data may not add to total shown because of rounding. Auger is not included.
[2] The figure is given as a total for the three counties.
[3] This figure includes the county of Dekalb (20,000 tons) which was previously unlisted.

TABLE 19-5
ALABAMA, RATIOS

County	*Total Production (1,000's of short tons)*		*Tons Underground-mined Per Total Production*	
	1967	*1972*	*1967*	*1972*
Bibb	298	898	.22	0
Blout	233	260	0	0
Jackson	622	1,279	0	0
Jefferson	8,263	9,438	.77	.53
Marion	472	387	.60	.10
Shelby	570	101	.98	.02
Tuscaloosa	803	2,208	.03	0
Walker	4,028	5,465	.51	.43
Cullman, Etowah, Winston	197[2]	778	0	0
TOTAL[1]	15,486	20,814[3]		

[1] Data may not add to total shown because of rounding. Auger is not included.
[2] The figure is given as a total for the three counties.
[3] This figure includes the county of Dekalb (20,000 tons) which was previously unlisted.

TABLE 19-6
ALABAMA, CLASSES FOR DATA

Total Production (1,000's of short tons)				*Tons Underground-mined*			
1967		*1972*		*1967*		*1972*	
197/3							
66	1	101	>1	0		0	
66		778/3					
66		259		0		0	
		259		0	1	0	
233	2	259	2	0		0	1
298		260		4		0	
472		387		27		0	
570	3	898	>3	66		0	
622		1279	4	282	>2	2	No. 2
803		2208		561	>3	39	or 3
4028	>4	5464	5	2039	>4	2326	>4
8263	>5	9438		6381	>5	5222	>5

Total Production

1 0 – 100
2 101 – 450
3 451 – 1000
4 1001 – 4000
5 4000 +

Tons Underground

1 0 – 100
2 101 – 450
3 451 – 1000
4 1000 – 4000
5 4000 +

APPENDIX: TEACHING MATERIALS

ORIGIN AND TYPES OF COAL IN THE UNITED STATES

The development of coal began with the decay and compression of plants growing in ancient fresh- and brackish-water swamps. These plant deposits (known as peat) eventually subsided and were buried by layers of sand, silt, and other materials. Weight of overlying rock, heat produced by the depth of deposit, and time contributed to the evolution of peat into coal. Subsequent crustal uplifts of portions of the United States have raised extensive coal fields to their present positions where mining is possible. In other places erosion has exposed coal fields.

The United States is fortunate (especially in this energy-conscious era) to contain approximately one-fifth of the world's coal reserves, 99 percent of which are bituminous coal and lignite. Coal is ranked according to two criteria, (1) the percentage of fixed carbon and heat content, and (2) the percentage of sulfur, ash, and other unwanted ingredients. The percentage of fixed carbon and heat content increases from lignite to subbituminous coal to bituminous coal to anthracite. Also, coal has less volatility and water content in the higher grades.

Nevertheless, the higher-grade coal deposits found in the Appalachians are not as attractive to industry as they were in the past. First, many of the most accessible coal seams are depleted. The remaining deposits are available only at the higher costs of underground mining. Second, recent mine safety legislation has resulted in the closing of mines judged to be unsafe. Third, the public uproar over air pollution has led to the ban on high-sulfur coal (producing sulfur oxide gases) in concentrated metropolitan areas. Hence, a geographical shift is taking place from the high-sulfur and more inaccessible coal beds of Appalachia to larger, less developed coal fields of the Midwest (notable exceptions are high-sulfur areas in Illinois and nearby states), Great Plains, and West. The coal of the Great Plains region is especially attractive because of its low-sulfur content and its location at or near the surface. The stage is set for monumental strip-mining controversy in the months and years ahead.

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PROCEDURES FOR MAPPING

Study the data given in Table 19-1 and "Classes to Be Used for Mapping" (Table 19-2). Conventional methods used to form the classes for Table 19-1 data are given below. The teacher may want to use any one of the four methods listed; the classing method used in the discussion "Classes to Be Used for Mapping" should be noted under each map.

A. Simple arithmetic progressions or equal steps
   1. Range of data is found by subtracting the *lowest* numerical value from the *highest.*
   2. *Equal step* = $\frac{\text{Range of Data}}{\text{Number of Classes Desired}}$ (in this case, five)
   3. Classes are formed by adding the lowest numerical value + equal step and that sum + equal step, and so on.
   4. Each addition will provide the limits of that class, that is, indicate the numerical values to be put into a group.

B. Percentiles – an equal number of items in each class
   1. Count how many counties on the ranked list.
   2. Divide this total by the number of classes desired, in this case, five. 105 counties (total figure): $\frac{105}{5} = 21$. So, twenty-one counties would belong in each class.

C. Regular breaks (See also Table 19-2)
   1. Divide the highest number, the one at the top of the ranked column, by the number of classes desired, in this case, five.
   2. Add this number to itself five times to get the cut-off figure for the classes. 580 employees (top figure): $\frac{580}{5} = 116$
      a. Everything from 0-116 is the first class.
      b. 116 + 116 = 232. The second class is 117-232.
      c. 232 + 116 = 448. The third class is 233-448, and so on.

D. Natural breaks in a curve (See also Table 19-2)
On a piece of graph paper plot numbers on the y axis (vertical) and each successive state or county in rank order on the x axis (horizontal). The curve should be stepped and not smooth. Where there are significant breaks, draw a line and these will become the class limits. This must be done for each column of data on the chart.

Once the data have been divided into classes by one of the four different methods, plot the results on the state or county outline maps. A suitable shading symbolization might be:

Class 1 (lowest numerical class) – white
Class 2 – light dot pattern
Class 3 – medium line pattern
Class 4 – heavy line pattern
Class 5 (highest numerical class) – black (solid color)

Again, students are encouraged to use their imagination in selecting possible shadings, but make sure there is a gradation from light to dark. Use black pencil for good reproduction. Compare results and select the best.

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TEACHER DIRECTIONS FOR THE USE OF THE U.S. BUREAU OF MINES: MINERALS YEARBOOK AND THE U.S. CENSUS OF MINERAL INDUSTRIES: AREA REPORTS

It is expected that this unit will introduce students and teachers to the use of readily available data sources while studying regional trends in the coal industry. The years 1967 and 1972 have been selected so that the information from both sources will coincide.

The suggested Transparency data (although not comparing 1967 and 1972) is used to show how the data are listed, by county, for each state. Notice that the *Area Reports* emphasize number of establishments, number of employees, and production, while the *Minerals Yearbook* presents specific data on the *type* of production. Further examination reveals that data may be unavailable for certain counties. The states we have suggested for regional analysis have the least amount of missing data. Never-

theless, be aware that the *Area Reports* do not include data for counties whose coal industries have less than 100 employees. Also, to prevent full disclosure, the number of employees may be classified according to the symbols shown at the bottom of Table 19-3: Data for Transparency.

A convenient base map for each state is located at the beginning of each *Area Report* and can be copied for class distribution. Finally, the description of the regional coal industry, by state, in the *Minerals Yearbook* will provide useful background information.

DIRECTIONS FOR GAME/SIMULATION ACTIVITY

To the teacher:

GAMES

Games generally involve the following elements:

1. A choice of strategies, e.g., buying, selling, trading, and/or a combination of these
2. Decision making which demonstrates student insight into site and situation, e.g., changes in social and physical geography of bituminous coal
3. Some type of payoff, rewards, or deprivation dictated by either change or the choice of strategies
4. A set of rules to be known by all the players

SIMULATION

Simulation activities are of many types but generally include the following:

1. A conflict which involves compromise after examining all the evidence
2. A setting such as a hearing, debate, town meeting, or family meal
3. Roles that have names and occupations which indicate a set of values

20

The Census of Agriculture

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The Census of Agriculture is the single most useful source of land use data for rural United States.[1] It also provides a great amount of data on the organizational and operational characteristics of farms. However, only limited data are provided relating directly to farm population. The census has been taken over a long period of time during which there have been great changes in agriculture involving applied technology, land use, organizational traits, and scale. The census, therefore, has undergone numerous changes in definitions, classification systems, data collected, and methods of enumeration. Careful scrutiny of definitions, explanations, and census year comparability is a prerequisite to use, and information necessary for proper understanding is found in each census volume.

This essay focuses only on published reports of the decennial and mid-decennial agricultural census. Definitions, classifications, and basic kinds of data are emphasized, along with some problems of census use. A list of major publications of the various censuses is also provided.

HISTORY OF THE CENSUS

Early federal census publications include little information on agriculture.[2] No information relating to agriculture was provided in the 1790 (first), 1800 (second), or 1830 (fifth) decennial censuses. The 1810 census (third) includes facts on "production of

[1] For a thorough survey of land use statistics see M. Clawson, *Land Use Information* (Baltimore: The John Hopkins Press, 1965), 402 pp.

[2] The sources of information for this report are the various publications of the Bureau of Census on agriculture, unless otherwise stated.

the soil, and agricultural stock, so far as they have been reported. . . . " The 1820 census (fourth) provides employment information, including that in agriculture.

The first designated Census of Agriculture was taken in 1840, as part of the sixth census. From 1840 through 1920 the census was taken every ten years as part of the normal decennial census. Legislation enacted in 1910 provided that a Census of Agriculture be taken every five years beginning in 1915. Complications arising from World War I prevented implementation in the specified year, and so the first mid-decennial census was not taken until 1925. Census of Agriculture enumerations therefore are available at five year intervals since 1920. In 1954 the Bureau of Census shifted to the fourth and ninth year of each decade as the census year for agriculture.

The *1840 Census of Agriculture* provided only meager information. Data were included on employment in agriculture, the number of farm animals, the production of wool, crops, and the value of dairy products and poultry. A count of farms was not included until the census of 1850. The reports have since expanded to include massive arrays of data. Nearly every new census, particularly since 1880, has provided new categories of data. Specific topics are added or deleted as deemed necessary. For example, slave data were deleted in 1870 and tenure of farm operator added in 1880. In the *1969 Census of Agriculture* data on farm organization were included for the first time.

GEOGRAPHICAL BASIS OF PUBLISHED DATA

Although agricultural census data are collected for both minor civil divisions and census county divisions, the county is the smallest unit for which data are normally tabulated and published. The initial census year of 1840 was exceptional in that data were published for minor civil divisions in northern states. Limited data were also published for minor civil divisions in 1930. Most data available at the county level are also published for states, regions, divisions, and the United States (Fig. 20-1). Data were included in 1969 for all but 25 of 3,077 counties or census districts. The omissions are either because no farms were reported, or to avoid individual disclosure when ten or less farms per county are involved. Data are also collected and published for territories including American Samoa, Guam, Puerto Rico, Virgin Islands, and the Trust Territory of the Pacific Islands. The data provided by counties are normally most useful for the analysis of distributions and areal patterns.

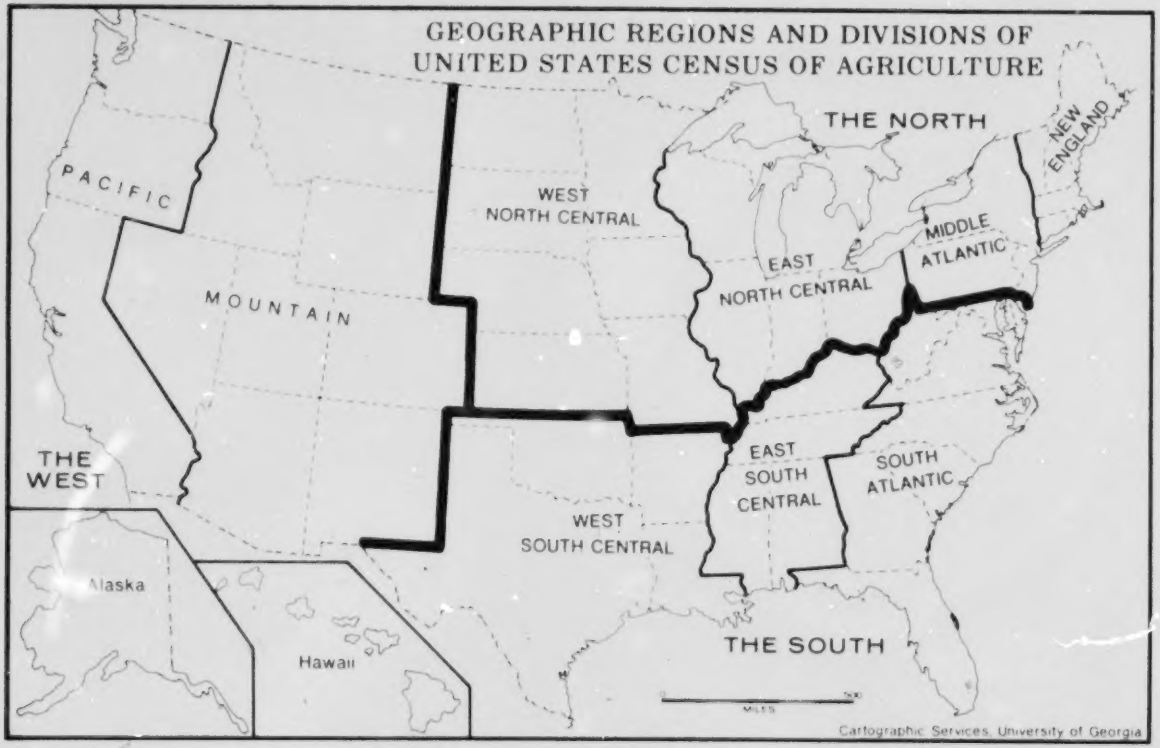
GEOGRAPHIC REGIONS AND DIVISIONS OF
UNITED STATES CENSUS OF AGRICULTURE
THE NORTH
NEW ENGLAND
MIDDLE ATLANTIC
EAST NORTH CENTRAL
WEST NORTH CENTRAL
PACIFIC
MOUNTAIN
THE WEST
EAST SOUTH CENTRAL
SOUTH ATLANTIC
WEST SOUTH CENTRAL
THE SOUTH
Alaska
Hawaii
Cartographic Services, University of Georgia

Figure 20-1.

FARMS AS A SOURCE OF CENSUS DATA

The Census of Agriculture deals with farms. Though that may seem to be an obvious point, it has significance for data interpretation. It is not a complete census of rural land use. Collection of data by farms assures the exclusion of information regarding certain nonagricultural forms of land use, such as urban and town land use, private rural nonfarm land, public land, and private and corporately owned nonfarm forest land. Federally owned lands used by ranchers in the western states, under permit or lease systems, also present a statistical problem. For example, in the 1969 census, national grasslands administered by the U.S. Forest Service, and used through grazing associations by permit, were included or counted as farm land. This involved 3.8 million acres, mostly in North Dakota, South Dakota, and Wyoming. Also included were 18 million acres of grazing land leased to farms and ranches by the U.S. Bureau of Land Management and state and local governments. On the other hand, grazing lands in National Forests administered by the U.S. Forest Service were excluded (60 million acres). Also excluded were 157 million acres of rangeland used under permit and administered by the Bureau of Land Management.

Some nonagricultural land, although not on farms, is listed in the census, including "forest land not grazed." The total acreage involved is approximately 15 percent of all farmland for the nation, but the percentage is substantially higher in some portions of the United States.

Data provided on land use, though having reference to the most important rural land in the United States, is actually inclusive of less than half the land area of the fifty states. If Alaska is excluded, a huge area with only minor farmland area, slightly more than half the land of the United States is included in the Agricultural Census survey. Nevertheless, the Census of Agriculture remains the single most useful source of land use data for rural land in this country.

One might argue that what occurs on this nonfarm land is not a major concern; however, the changing nature of our society during the past fifty years clearly suggests the opposite. Nearly 50 million people continue to reside in nonurban or rural areas (the vast majority of these people are nonfarm population), and many rural land problems relate to nonagricultural use of land. Recent discussions by the author with Soil Conservation Service officials provide an example. These officials find that implementation of programs requires dealing with rural nonfarm people – urban

workers who are rural residents but who are not directly related to agricultural activities. The increasingly important nonagricultural function of rural land requires new sources of data — particularly on size of holdings and land cover.

CENSUS DEFINITION OF FARM

The census farm was first defined in 1850, but its definition has since been changed numerous times. In all censuses the definition has been based upon an operational unit, not an owned unit. Farms are defined as agricultural operations under the control of one person or a single management. The operational definition results in defining places operated by tenants or managers as one farm, i.e., four tenants operating separate subunits on one ownership tract are counted as four farms. The definition also results in owned land, and rented land (even if consisting of several spatially separate tracts), being counted as one farm if operated under the control of one person. Minimum limits for operational units classed as farms have been based upon such varying criteria as measures of land area or acres in place, land use, agricultural output, or value of agricultural products sold (Tables 20-1 and 20-2). The census, therefore, includes data only for land which functions as a farm.

In most censuses prior to 1950 enumerators were instructed to decide whether an operation constituted a farm. Inconsistency in their judgements may have affected the count during earlier years. The present system requires data collection on all agricultural operations, with "farm" or "nonfarm" editing decisions occurring during tabulation at the Bureau. In 1969 a mailing enumeration system was used which may have led to significant undercounting of small farms.

Recent changes in definition (1959, 1964, and 1969) probably have had only minimal effects on data comparability. The change from 1954 to 1959 involved an increase of the small farm limit from "less than 3 acres" to "less than 10 acres." A minimum value of products sold limit of $250 was placed on small farms (less than 10 acres) and a minimum of $50 on larger farms (more than 10 acres). Though this change resulted in a farm count decrease of 232,000 farms, the impact on land use and production data was probably insignificant since only the small and marginal farms were affected.

The change in 1964, a replacement of minimum value of product measures with land use and commodity measures, probably increased the count of farms. Most of this increase

TABLE 20-1
MINIMUM CRITERIA FOR CENSUS FARMS OF LESS THAN THREE ACRES – CENSUSES OF 1850 TO 1969

Census Year	*Minimum value of agricultural products produced for home use or for sale (dollars)*	*Minimum value of agricultural products sold (dollars)*	*Other Criteria*	*Number of farms of less than 3 acres*
1969[1]	Not applied	250	Agricultural operations	78,868[4]
1964[1]	Not applied	250	5 or more acres of crop failure, 100 or more chickens, 4 months old and over, 10 or more sheep and lamb on hand, 10 or more goats and kids on hand, 10 or more hogs and pigs on hand, 10 or more cattle and calves on hand, 4 or more cows on hand, 0.3 acres or more of tobacco harvested, 500 pounds or more of tobacco harvested, 2 or more acres in vegetables, berries, and orchards, or 5 or more acres of corn when there were no cattle and calves or hogs and pigs on hand.	59,686[4]
1959[1]	Not applied	250	None[3]	79,000
1954	Not applied	150	None	100,000[5]
1950	Not applied	150	None	77,000
1945	250	Not applied	None	99,000[5]
1940	250	Not applied	None	36,000
1935	250	Not applied	None	36,000[5]
1930	250	Not applied	None	43,000
1925	250	Not applied	None	15,000[5]
1920	250[2]	Not applied	None	20,000
1910	250[2]	Not applied	None	18,000[5]
1900	Not applied	Not applied	Constant services of at least one person	41,000
1890	Not applied	500	None	(NA)
1880	Not applied	500	None	4,000
1870	Not applied	500	None	(NA)
1860	100	Not applied	None	(NA)
1850	100	Not applied	None	(NA)

Source: Adapted from Census of Agriculture.

NA – Not available.

[1] The minimum size criteria for 1964 and 1959 applied to places of less than 40 acres.
[2] Not applicable when farm required services of at least one person.
[3] Criteria similar to those for those for 1964 were applied for places having agricultural operations which normally could be expected to produce sales of products of $250 or more.
[4] The number of farms of less than 10 acres was 182,581 in 1964 and 162,111 in 1969.
[5] Data for Alaska and Hawaii not included.

TABLE 20-2
MINIMUM CRITERIA FOR CENSUS FARMS OF THREE OR MORE ACRES – CENSUSES OF 1850 TO 1969

Census Year	*Minimum value of agricultural products produced for home use or for sale (dollars)*	*Minimum value of agricultural products sold (dollars)*	*Other Criteria*	*Change in number of farms because of change in definition (includes change for farms under 3 acres)*
1969[1]	Not applied	50	Agricultural Operations	
1964[1]	Not applied	50	Two or more acres of crop failure, 5 or more acres of land in summer fallow, 5 or more acres of cropland pasture or improved other pasture, 10 or more acres of other pasture and woodland pasture, 50 or more chickens 4 months old and over on hand, 5 or more sheep and lambs on hand, 5 or more goats and kids on hand, 5 or more hogs and pigs on hand, 5 or more cattle and calves on hand, 2 or more cows on hand, 0.2 acres of tobacco harvested, 100 or more pounds tobacco harvested, 0.5 acres or more in vegetables, berries, and orchards, 3 or more acres of hay and no cattle on hand, 2 or more acres of corn when there were no cattle and calves or hogs and pigs on hand.	
1959[1]	Not applied	50	None[3]	
1954	150	Not applied	None	-232,000
1950	150	Not applied	None	
1945	150[2]	Not applied	Agricultural operations comprising 3 or more acres of cropland or pastureland.	-160,000
1940	Not applied	Not applied	Agricultural operations.	
1935	Not applied	Not applied	Agricultural operations.	
1930	Not applied	Not applied	Agricultural operations.	
1925	Not applied	Not applied	Agricultural operations.	
1920	Not applied	Not applied	Agricultural operations.	
1910	Not applied	Not applied	Agricultural operations.	
1900	Not applied	Not applied	Agricultural operations and continuous services of at least 1 person.	
1890	Not applied	Not applied	Agricultural operations.	
1880	Not applied	Not applied	Agricultural operations.	
1870	Not applied	Not applied	Agricultural operations.	
1860	100	Not applied	None.	
1850	100	Not applied	None.	

Source: Adapted from Census of Agriculture

[1] The minimum size criteria for 1964 and 1959 applied to places of 10 or more acres.
[2] Applied only if farm had less than 3 acres of cropland and pasture.
[3] Criteria similar to those for 1964 were applied for places having agricultural operations which formally could be expected to produce sales of products of $50 or more.

probably involved "miscellaneous," "part-time," or "part-retirement" farms of little economic or land use significance. Attention to changes in farm definition is essential when variable census year comparisons are made which include Class 6 farms, part retirement, or part time farms. There have been numerous definition changes relating to features other than farm size.

PROBLEMS WITH THE OPERATIONAL DEFINITION OF FARMS

The operational definition of the farm has contributed to difficulties in identifying the specific organizational character of some farms – particularly where large landholdings are involved. Recognition of the problem is especially important when dealing with historical statistics on the South.

Prunty has elaborated on this problem, and on the approach taken by the Bureau of Census, as it relates to the South.[3] Prior to 1870 the census reported any operational unit, whether plantation or small holding, as a farm. Plantations did not disappear after the Civil War, but rather, underwent profound organizational and spatial adjustment.[4] The plantation, as a spatial unit, was "fragmented into subunits." The numerous subunits were operated under a variety of tenancy systems which evolved in the decades after 1870. The tenancy systems included varying degrees of centralized control and management. This made the application of an operational definition of farm assuredly difficult, for the basic question then is, who is the operator? The landowner, or the individual tenant?

The census approach was to enumerate each tenant subunit, regardless of central control and management, as an individual farm. The number of farms enumerated, therefore, was greatly inflated and the average size deflated. Counting all tenant units as farms, moreover, made it almost impossible to discern the organizational and operational character of southern landholdings. Some tenants farming land under close owner supervision (sharecroppers) were not, from an operational standpoint, independent farmers. They functioned as no more than landless laborers. Others, including tenant-renters, did in fact make independent

[3] Merle Prunty, Jr., "The Census on Multiple-Units and Plantations in the South," *The Professional Geographer*, Vol. 8 (September, 1956), pp. 2-5; see also Howard F. Gregor, "The Plantation in California," *The Professional Geographer*, Vol. 14 (March, 1962), pp. 1-4, in which the author suggests other ways false impressions may be gained by using census data.

[4] Merle Prunty, Jr., "The Renaissance of the Southern Plantation," *The Geographical Review*, Vol. 45 (1955), pp. 459-91.

decisions. They provided their own equipment and supplies, thereby deserving of classification as an individual farm operator. The Bureau of Census, however, also contended that the sharecropper was deserving of recognition as an operator, for he shared the risk with the owner, and if the crop failed, he too suffered economic loss. The problem remained from 1870 until the mid-20th century demise of traditional tenancy systems.

The Bureau of Census has recognized the problems stemming from the operational definition of farms. In 1910 the census tried to improve the situation by defining a tenant plantation, thus giving recognition to the plantation as a distinct type of operational unit. The plantation was defined as a large and continuous tract of land, managed by an individual or firm, but subdivided into five smaller tracts leased to tenants. As Prunty pointed out, however, not distinguishing the tenant varieties still left a problem because the degree of central management varied, depending upon the specific tenancy system used.[5] Furthermore, only selected coastal plain counties were enumerated using the new definition, thereby omitting significant plantation areas.

A slightly revised definition was used in 1940 but the results were not published. In 1945 yet another definition was specified, identifying *multiple units* as a landholding with two or more subunits, with at least one subunit tenant-operated. Nine southern states and 567 counties were included in the enumeration. Yet another definition was applied in 1950 to 902 counties and fourteen southern states. The last multiple unit enumeration published (1954) was based on 891 counties. Despite Bureau efforts to confront the problem, definitions have varied and areas included for enumeration have not been consistent.[6]

Unfortunately, not only does the operational definition mislead us somewhat during the period from 1870 to 1950, but in recent decades the meaning of "decline of farms" is also difficult to discern. In areas where the multiple unit operation and plantations were involved, farm statistics frequently show an increase in the number of "owner farms" (a tenure category) simultaneously with the decline of "tenant operator farms" (Table 20-3). The decline of tenant farms sometimes reflects disappearance of farming operations and land abandonment, but more often, it is indicative of farm reorganization involving a shift to central con-

[5] Prunty, op. cit., footnote 3, p. 4.

[6] For a detailed history and graphic summary of the census reporting of multiple-unit operations see the *United States Census of Agriculture, 1954, Vol. III, Part 1, Multiple Unit Operations,* (Washington, D.C.: Government Printing Office, 1957), pp. IX-XXXVI.

TABLE 20-3
CHANGING FARM TENURE:
MORGAN COUNTY, GEORGIA[1]

Year	*Owner and Part-Owner Farms*	*Tenant Operator Farms*
1919	407	2,497
1924	395	1,152
1929	333	1,449
1934	358	1,357
1939	372	946
1944	489	953
1949	580	705
1954	610	482
1959	456	205
1964	428	101
1969	407	34

Source: Census of Agriculture

[1]The county represented experienced both agricultural decline and farm reorganization during the 1940's, 1950's, and 1960's. Decline in tenancy was sometimes associated with farm land abandonment, but often reflects farm reorganization and changing operational systems; therefore, the increase in number of owner operated farms for a number of census years are coincident with decline of tenancy. Data on declining farms must be interpreted in light of census definition of farm and with reference to other indicies of land use adjustment.

trol and management. The effects of reorganization are particularly significant to the interpretation of farm statistics during the 1940's, 1950's, and early 1960's.

FARM CLASSIFICATION AND GROUPING

FARMS BY ECONOMIC CLASS

The economic classification of farms has remained the same for several census years, with just a few minor changes (Table 20-4). In 1959, 1964, and 1969, in addition to the traditional enumeration, Class 1 farms were subdivided into subclasses 1a and 1b. Class 1a farms (with $100,000 or more in farm products sold) are designated as "large farms" for which selected data are presented separately.

Data from the *1969 Census of Agriculture* are published in two basic categories: (1) all farms, and (2) farms with sales of $2,500 and over (Economic Classes 1-5). The 1964 and earlier censuses contained a definition called "commercial farms," based on data for the *six* economic classes, rather than *five*. Data provided in 1969 for farms with sales over $2,500 (five classes)

TABLE 20-4
FARMS BY ECONOMIC CLASS

Class	*Farm Product Sales (dollars)*
1	40,000 or more
1a	100,000 or more
1b	40,000 to 99,000
2	20,000 to 39,999
3	10,000 to 19,999
4	5,000 to 9,999
5	2,500 to 4,999
6	50 to 2,499 and a farm operator under 65 years of age and who *did not* work off the farm 100 days or more in the census year.
part time	50 to 2,499 and a farm operator who is under 65 years of age and who *did* work off the farm 100 days or more in the census year.
part retirement	50 to 2,499 and a farm operator who is 65 years or over.
abnormal	Includes institutional farms and experimental and research farms, and Indian reservations.

Source: Census of Agriculture.

cannot, therefore, be compared directly with totals for "commercial" farms (six classes) in previous censuses. For 1969, data are provided for Class 6 farms in Volume I, Table 9 for each state, thereby allowing some data adjustments for comparability.

Prior to 1964 the distinction between Class 6 and part time farms was affected by reported off-farm income. The off-farm income was dropped as a consideration in 1964, adding to the number of Class 6 farms, and decreasing the number of part time farms.

The census definitions used in establishing farms by economic class and the organization of data into "all farms" and "farms with sales of $2,500 or more" could lead users astray. Review of the definitions implicitly suggest that Class 1-6 farms, in contrast to the part time, part retirement, and abnormal classes, are commercial. Users should be careful not to assume that all Class 1-6 farms are economically viable. Hart has suggested a definition of "real farms" as all those with $10,000 or more in farm products sold.[7] The use of this particular figure is debatable, as Hart himself

[7] John Fraser Hart, "A Map of the Agricultural Implosion," *Proceedings*, Association of American Geographers, Vol. 2 (1970), pp. 68-71.

suggested; however, his basic suggestion has merit. Only farms large enough to provide an adequate level of living for the farmer and his family would provide a more logical basis upon which to identify commercial farming. The more restricted definition also presumably would allow a more realistic delineation of agricultural regions.

FARMS BY TENURE OF OPERATOR

Farms have been classified by tenure of operator since 1880, and since 1900 with tenure distinctions based on "color and race."[8] In the censuses of 1880 and 1890 only the number of farms is available by tenure of operator. Beginning with the census of 1900 and continuing to the present, numerous items are available but with variations from census to census.

The tenure classifications used in the censuses of 1880 and 1890 included farms cultivated by owners and farms rented.[9] From 1900 to 1964 tenure classifications included full owners, part owners, managers, and tenants.[10] The tenants have been divided into a variety of subgroups, depending upon significance in any given area. For example, croppers were reported as a tenant subtype from 1920 through 1959.

The classification by tenure in 1969 differs slightly from previous years. The tenure category of "manager" is no longer used. Farms previously classified as manager-operated were distributed among all other operator categories. However, since number of manager-operated farms were normally low, comparability is only rarely affected in any significant way. The manager-operated farm was difficult to define, and had become increasingly so with enumeration by mail. Also, while data on tenant subtypes are published by states and larger areas, subtypes are no longer available by counties.

FARMS BY COLOR AND RACE OF OPERATOR

The first classification by color and race of farm operator appeared in 1900. Classification by color has included two major subdivisions, namely, "white" and "nonwhite." More detailed breakdowns are available in each decennial census, and in all mid-

[8] "Color and Race" are teams used by the Bureau of Census.

[9] For a summary of Bureau of Census tenure classification systems used from 1880-1964 see the *United States Census of Agriculture, Vol. II, Chapter 8, Color, Race, and Tenure of Operator.* (Washington, D.C.: Government Printing Office, 1968), pp. 745-53.

[10] Part owners are farm operators who rent land which is then operated in conjunction with land already owned.

decennial censuses since 1954. The detailed breakdowns include separate counts for Negro and other nonwhite operators. The decennial census prior to 1954 included separate totals for Negroes, Indians, Chinese, Japanese, Filipinos, and "others."

In the *1969 Census of Agriculture, Volume I, Area Reports* (states and counties) data are provided for "Negro operated farms" for the years 1959, 1964, and 1969. The data for 1959 and 1964 reported as "Negro operated farms" are actually data on "nonwhite operators." In most instances this does not significantly affect data comparability. Examples of exceptions might include Oklahoma and North Carolina where Indians do affect comparability.

FARMS BY TYPE OF ORGANIZATION

Data by type of farm organization is a new category, provided in 1969 for the first time. The following are the classifications used:

1. Individual or family farms (excluding partnerships and corporations with family origin)
2. Partnership
3. Corporation (including those of family origin)
   a. with ten or fewer shareholders
   b. with more than ten shareholders
4. Others (includes estates, trusts and institutions)

Data on farm organization were collected for Class 1-5 farms only, but along with data on tenure, provide useful information on farm operational characteristics.

FARMS BY SIZE-OF-FARMS

The earliest data on size-of-farm was provided in 1860, but for that census year and 1870, size was based upon acres of improved land rather than total acres in the farm. The first classification by size based upon total farm acreage was published in 1880. Table 20-5 can be used to identify the size-of-farm groups used in specific census years; obviously, revisions of groupings have been common.

The number of farms was the only statistic available by size-of-farm from 1880 to 1900. From 1900 to 1935 size-of-farm data included a count of farms, data for all land in farms, and the more important classes of land use. From 1945 to the present much expanded data by size-of-farm includes farms, land in farms by use, number of livestock and poultry, farm equipment, the

TABLE 20-5
SIZE OF FARM GROUPS: 1880 TO 1969

	1969	*1964*	*1959*	*1954*	*1935, 1940, 1945, 1950*	*1920, 1925, 1930*	*1880 to 1910*
Under 3 acres					X	X	X
3 to 9 acres					X	X	X
Under 10 acres	X	X	X	X			
10 to 19 acres					X	X	X
10 to 29 acres				X			
20 to 29 acres					X		
10 to 49 acres	X	X	X				
20 to 49 acres						X	X
30 to 49 acres				X	X		
50 to 69 acres	X	X	X	X	X		
50 to 99 acres						X	X
70 to 99 acres	X	X	X	X	X		
100 to 139 acres	X	X	X	X	X		
100 to 174 acres						X	X
140 to 174 acres					X		
140 to 179 acres	X	X	X	X			
175 to 179 acres					X		
175 to 259 acres						X	X
180 to 219 acres	X	X	X	X	X		
220 to 259 acres	X	X	X	X	X		
260 to 379 acres		X			X		
260 to 499 acres	X		X	X		X	X
380 to 499 acres		X			X		
500 to 699 acres		X			X		
500 to 999 acres	X		X	X		X	X
700 to 999 acres		X			X		
1000 acres and over				X	X		X
1,000 to 1,999 acres	X	X	X				
1,000 to 4,999 acres						X	
2,000 acres and over	X	X	X				
5,000 acres and over						X	

Source: Census of Agriculture

production or sale of livestock and poultry products, the acreage and production of crops, farm expenditures, and others.

Farms are classified by size and as operational units. Data on size-of-farm is not indicative of ownership tracts. Land owned and rented, whether contiguous or not, is included in size enumeration. Conversely, land rented to, and operated by others, is not included in the owners size enumeration.

FARMS BY TYPE

Classification by type-of-farm is based upon major sources of farm income. Fifty percent or more of total value of products sold must be derived from a specific commodity before the farm is classified in a specific commodity type (Table 20-6).

Farms have been classified by type since 1930. Criteria for classification by type have not been uniform, and comparability of recent census years (1964 and 1969) with those prior to 1959 is not good. Comparability since 1950 is fairly good for farms with product sales of $2,500 or more, or Class 1-5 farms in the conterminous United States. Tobacco farms were only first identified as a type in 1959; previously they were included with field crop farms. In the 1959 census the "miscellaneous farms" did not include fur-bearing animals, bees, honey, goat milk, and farms with no value of farm products sold.

Classification of farms by type allows identification of type of farming regions, variations in the resource use, and the nature of agricultural production. Other classifications cross-listed by type-of-farm include: (1) size of farm, (2) tenure of operators, and (3) economic class.

LAND USE

Data in any land use category are representative only of "land in farms." The approximate land area of any areal unit (county, state, or other) is available; hence data transformations are possible which aid in placing land use on farms in the proper area-wide perspective.

Land use categories used in the 1969 census relating to cropland include: (1) cropland harvested, (2) cropland used only for pasture, (3) all other cropland, and (4) total cropland. Item (3), "all other cropland," is called "cropland not harvested and not pastured" in earlier censuses. It is also further subdivided into other categories: (1) cropland in soil improvement and cover crops, (2) crop failure, (3) cultivated summer fallow (Western

TABLE 20-6
TYPE OF FARM

Type	*Products Used in Classification*
cash-grain	corn, sorghums, small grains, wheat, soybeans for beans, cowpeas for peas, dry field and seed beans and peas
tobacco	tobacco
cotton	cotton and cottonseed
other field crops	peanuts, potatoes, sugar cane (for sugar or syrup), sweet sorghums for syrup, broom corn, popcorn, sugar beets, mint, hops, sugar beet seed, and pineapples
vegetables	vegetables
fruit and nuts	berries, other small fruits, tree fruits, grapes, nuts, and coffee
poultry	chickens, eggs, turkeys, and other poultry products
dairy[1]	dairy products
livestock other than dairy and poultry[2]	cattle, calves, hogs, sheep, goats, wool, and mohair
livestock ranches[3]	livestock, wool, and mohair[4]
general[5]	field seed crops, hay, grass, and silage
miscellaneous	nursery and greenhouse products, forest products, mules, horses, colts, ponies, fur-bearing animals, bees, honey, goat milk, and farms with no value of farm products sold. Also, all institutional farms and Indian reservations.

Source: Census of Agriculture.

[1] The standard criteria of 50 percent total sales from a commodity or related commodities was modified for dairy farms. Farms were classified as dairy farms if less than 50 percent of the total value of farm products sold was:
a. dairy products totaled more than 30 percent of value of products sold
b. 50 percent or more of all cows were milk cows
c. value of dairy products sold plus the value of cattle and calves sold amounted to 50 percent or more of the total value of all farm products sold.

[2] Classification applies only to farms in states other than the seventeen western states, Louisiana, Florida, Hawaii, and Alaska.

[3] Classification applies only to farms in the seventeen western states, Louisiana, Florida, Hawaii, and Alaska.

[4] Livestock ranch applied if sales of livestock, wool, and mohair total 50 percent or more of the total value of farm products sold, and if pastureland or grazing land amounted to 100 acres or more and was ten times or more the acreage of cropland harvested.

[5] A farm was also classified as general if cash income was for three or more sources and did not meet the criteria for other types.

States only), and (4) idle cropland.[11] Unfortunately, the latter subdivisions are provided only for class 1-5 farms in 1969, somewhat complicating comparisons with earlier censuses. The woodland classification is subdivided into "woodland pastured" and "woodland not pastured." The latter may be considered forest land on farms, but is not inclusive of all forest land in the United States. Data is also available for "other pastureland and rangeland" and "all other lands" (land occupied by buildings, roads, ditches, ponds, or others).

Detailed cropland data (by specific crops) are provided in various General Reports, Area Reports, and Special Reports. Special Reports provide a vast array of data relating to the production of specific commodities. Area reports provide individual crop data which includes acreage, quantity of production, and value for selected items.

THE 1969 CENSUS OF AGRICULTURE

The most recent census published (1969) is useful for illustrating the kinds of data collected. The general approach to publication by volumes and parts have been the same for several census years.

Volume I, Area Reports, is divided into parts, one for each state and territory enumerated. Each part is further divided into two sections. Summary data for the state and limited county data are found in Section 1. Section 2 provides data by counties. For each county the data are organized in twenty-six tables by topics. Tables 1-8 for each county provide data for "all farms," tables 9-26 include data on Class 1-5 farms only.

County Tables 1, 2, 7, and 8 (all farms) include data on number of farms, various land use categories, specific crops, livestock and poultry, and land use by size-of-farm. Organizational and operational traits can be discerned by use of data on tenure, age of operator, or off-farm residence and time worked off the farm (County Table 3). Data on economic class, value of farm products sold, sources of farm income (by commodity), and detailed data on production expenses allow identification of economic characteristics of farms (County Table 4 and 5). Data on machinery use are also available in County Table 6.

The tables for Class 1-5 farms include the same data, but in greater detail and with additional data categories. Additional data

[11] For a review of problems in using selected land use categories provided in the census see James R. Anderson, "The Dilemma of Idle Land in Mapping Land Use," *The Professional Geographer*, Vol. 14 (May, 1962), pp. 16-18.

are available on crops, irrigation and land drainage (County Tables 11 and 20), farm income and sales, production expenses, hired farm workers, and agricultural chemicals used.

Volume II, U.S. Summary, provides the same information as Volume I, (along with some data not previously published) but with emphasis on the state, region, and the United States as areal units. Some data are also presented in greater detail; for example, data on tenants includes a breakdown by subtypes. The volume is divided into nine chapters organized on a topical basis.

Volume III, Agricultural Services, includes data on agriculture-related activities not previously included in the census. The addition of this volume reflects the increasing specialization of agriculture and farmer dependence upon many specialized services.

Agricultural service "establishments" are enumerated by number, gross receipts for services provided, labor force, and payroll. An agricultural service establishment is defined as an economic unit primarily engaged in activities included in Standard Industrial Classification (SIC) Major Industry Group 07 (Agricultural Services and Hunting and Trapping).[12] Four industry group levels are included (three digit SIC): (1) agricultural services (except animal husbandry and horticulture), (2) animal husbandry services, (3) horticultural services, and (4) hunting, trapping and game preparation. The SIC four digit division by ten industries is modified by the Bureau of Census into thirteen "establishment" types. A fifth digit is added to the coding system to identify agricultural service activities belonging to a type. Data published are for the United States, regions, divisions, states, and counties.

Volume IV, Irrigation, and Chapter 9, *Irrigation and Drainage on Farms*, of *Volume II, U.S. Summary*, and *Volume VI, Drainage of Agricultural Lands* can be used for studies of these topics.[13] Data are presented for twenty-one water resource areas as well as states and regions.

Volume V, Special Reports, has some comparability with special reports of previous census years. The *Special Reports* consist of sixteen parts, the first nine of which are reports by type-of-farm. Data is included for significant counties and for all states and larger areal units.

[12] *Standard Industrial Classification Manual* (1967 edition), Office of Management and Budget, Executive Office of the President.

[13] Leslie Hewes, "Drained Land in the United States in the Light of the Drainage Census," *The Professional Geographer*, Vol. 5 (November, 1953), pp. 6-12 reviews the census publication of data on land drainage for 1950 and earlier census years, suggesting how census publications on this topic are misleading.

SUMMARY

The Bureau of Census has published a great amount of data on agriculture. Its use requires careful review of census definitions and enumeration methods. Year-to-year comparability is frequently complicated by changes in definition or procedure; nevertheless, the published data are useful for historical and areal studies.[14] The following list of publication titles illustrates the variety of data available. Titles are presented by census year.

[14] Some examples of studies based in some part on the use of published census data are, H. F. Gregor, "The Large Industrialized American Crop Farm: A Mid-Latitude Plantation Variant," *The Geographical Review*, Vol. LX (1970), pp. 151-76; S. B. Hilliard, "Pork in the Ante-Bellum South: The Geography of Self-Sufficiency," *Annals*, The Association of American Geographers, Vol. 59 (1969), pp. 461-480; H. F. Gregor, "Farm Structure in Regional Comparison: California and New Jersey Vegetable Farms," *Economic Geography*, Vol. 45 (1969), pp. 209-225; and J. F. Hart, "Loss and Abandonment of Cleared Farm Land in the Eastern United States," *Annals*, The Association of American Geographers, Vol. 58 (1968), pp. 417-440.

PUBLICATIONS OF THE REGULAR DECENNIAL AND MID-DECENNIAL CENSUSES OF AGRICULTURE 1840 – 1969

SIXTH (DECENNIAL CENSUS: 1840

Aggregate Amount of Each Description of Persons within the United States and Their Territories According to the Census of 1840

Compendium of the Enumeration of the Inhabitants and Statistics of the United States . . .

SEVENTH (DECENNIAL CENSUS: 1850

Statement of Agricultural Productions, Value of Improved and Unimproved Lands, Agricultural Implements, Etc., in the United States

Statistical View of the United States . . . Compendium of the Seventh Census, Part IV: Industry, No. 1, Agriculture

EIGHTH (DECENNIAL) CENSUS: 1860

Population of the United States in 1860

Agriculture of the United States in 1860

NINTH (DECENNIAL) CENSUS: 1870
The Statistics of the Wealth and Industry of the United States
    Statistics of Agriculture
    The Major Tables of Occupations
A Compendium of the Ninth Census
    Occupations
    Agriculture
Statistical Atlas of the United States Based on the Results of the Ninth Census: 1870, Part II: Population, Social and Industrial Statistics

TENTH (DECENNIAL) CENSUS: 1880
Report on the Productions of Agriculture
Report on Cotton Production in the United States
Compendium of the Tenth Census
    Agriculture
    Occupations

ELEVENTH (DECENNIAL) CENSUS: 1890
Report on the Statistics of Agriculture in the United States
Report on Agriculture by Irrigation in the Western Part of the United States . . .
Report on Farms and Homes: Proprietorship and Indebtedness in the United States . . .
Statistical Atlas of the United States
Compendium of the Eleventh Census: 1890

TWELFTH (DECENNIAL) CENSUS: 1900
Vol. V, Agriculture, Part 1: Farms, Livestock, and Animal Products
Vol. VI, Agriculture, Part 2: Crops and Irrigation
Statistical Atlas of the United States

THIRTEENTH (DECENNIAL) CENSUS: 1910
Vol. V, Agriculture, 1909 and 1910: General Report and Analysis
Vol. VI and VII, Agriculture, 1909 and 1910: Reports by States with Statistics for Counties
Statistical Atlas of the United States

FOURTEENTH (DECENNIAL) CENSUS: 1920
Vol. V, Agriculture: General Report and Analytical Tables
Vol. VI, Agriculture: Reports for States, with Statistics for Counties and a Summary for the United States and the North, South, and West

Vol. VII, Irrigation and Drainage
Statistical Atlas of the United States
State Compendium
Farm Tenancy in the United States
Farm Population of the United States
Census of Agriculture: 1925, Reports for States, with Statistics for Counties and a Summary for the United States
Part 1. The Northern States
Part 2. The Southern States
Part 3. The Western States
Summary Statistics by States

FIFTEENTH (DECENNIAL) CENSUS: 1930
Reports on Agriculture and the Irrigation and Drainage of Agricultural Lands
Vol. I. Farm Acreage and Farm Values by Townships or Other Civil Divisions
Vol. II. Reports by States, with Statistics for Counties and a Summary for the United States
Vol. III. Type of Farm – Reports by States, with Statistics for Counties and a Summary for the United States
Vol. IV. General Report – Statistics by Subjects
Horticulture – Statistics for the United States and for States, 1929 and 1930.
Irrigation of Agricultural Lands
Drainage of Agricultural Lands
Chickens and Chicken Eggs and Turkeys, Ducks, and Geese Raised on Farms.
The Farm Horse
Farm Real-Estate Values in the New England States, 1850 to 1930
Large-Scale Farming in the United States, 1929
The Negro Farmer in the United States
Taxes on Farm Property in the United States
Statistics by Counties: First Series – Farms, Acreage, Values, and Selected Livestock and Crops
Statistics by Counties: Second Series – Selected Crops and Livestock, Mortgages, Taxes, etc.
Statistics by Counties: Third Series – Type of Farm
Number of Farms, Farm Acreage, and Values of Farm Land and Buildings, Farm Buildings, Farmers' Dwellings and Farm Implements and Machinery by Minor Civil Divisions
General Statistics: Summary for the United States, 1929 and 1930
United States Census of Agriculture: 1935

Vol. I. Reports for States with Statistics for Counties and a Summary for the United States
Vol. II. Reports for States with Statistics for Counties and a Summary for the United States.
Vol. III. General Report – Statistics by Subjects
Part-time Farming in the United States

SIXTEENTH (DECENNIAL) CENSUS: 1940
Agriculture
Vol. I. First and Second Series State Reports – Statistics for Counties
Vol. II. Third Series State Reports – Statistics for Counties
Vol. III. General Report – Statistics by Subject
Abandoned or Idle Farms – A Special Study
Cash Rent Paid, or Payable by Cash Tenants and by Part Owners Renting on a Cash Basis
Cows Milked and Dairy Products
Crop-Sharing Contracts (Appendix Section of Special Study – Plantations)
Cross-Line Acreage – A Special Study
Handbook
Ranking Agricultural Counties
Special Cotton Report
Special Poultry Report
Uses of the 1940 Census Data in Schools
Value of Farm Products by Color and Tenure of Farm Operator
Analysis of Specified Farm Characteristics for Farms Classified by Total Value of Products
Farm-Mortgage Indebtedness in the United States
Irrigation of Agricultural Lands
Irrigation of Agricultural Lands – Tabular and Graphic Presentation of Specified Irrigation Census Statistics
Drainage of Agricultural Lands
Drainage of Alluvial Lands
Territories and Possessions

CENSUS OF AGRICULTURE: 1945
Vol. I. Statistics for Counties
Vol. II. General Report – Statistics by Subjects
Special Reports
Multiple-unit Operations
Ranking Agricultural Counties
Report for 1945 Sample Census of Agriculture

Farms of Nonwhite Farm Operators . . . Censuses of 1945 and 1940
Farm – Mortgage Debt in the United States: 1945
Farms and Farm Characteristics
  By Size of Farm
  By Value of Products
  By Type of Farm
Farm Work Power
Farms and Farm Characteristics by Color and Tenure of Operator

CENSUS OF AGRICULTURE: 1950
Vol. I. Counties and State Economic Areas
Vol. II. General Report
Vol. III. Irrigation of Agricultural Lands
Vol. IV. Drainage of Agricultural Lands
Vol. V. Special Reports
  Part 1. Horticultural Specialties
  Part 2. Multiple-unit Operators
  Part 3. Ranking Agricultural Counties
  Part 4. Land Utilization; a Graphic Summary
  Part 5. Farm Tenure; A Graphic Summary
  Part 6. Agriculture 1950; A Graphic Summary
  Part 7. Irrigation 1950
  Part 8: Farm-Mortgage Debt
  Part 9: Economic Class and Type of Farm: A Graphic Summary
  Part 10. Farms and Farm Characteristics by Economic Subregions
Farms and Farm People

CENSUS OF AGRICULTURE: 1954
Vol. I. Counties and State Economic Areas
Vol. II. General Report – Statistics by Subjects
Vol. III. Special Reports
  Part 1. Multiple-unit Operations
  Part 2. Ranking Agricultural Counties
  Part 3. Alaska, Hawaii Puerto Rico, District of Columbia, and U.S. Possessions
  Part 4. Agriculture, 1954, A Graphic Summary
  Part 5. Farm Mortgage Debt
  Part 6. Irrigation in Humid Areas
  Part 7. Popular Report – The American Farmer in 1954
  Part 8. Size of Operation by Type of Farm
  Part 9. Farmers and Farm Productions in the United States

Chapter I. Wheat Producers and Wheat Production
Chapter II. Cotton Producers and Cotton Production
Chapter III. Tobacco and Peanut Producers and Production
Chapter IV. Poultry Producers and Poultry Production
Chapter V. Dairy Producers and Dairy Production
Chapter VI. Western Stock Ranchers and Livestock Farms
Chapter VII Cash-grain and Livestock Producers in the Corn Belt
Chapter VIII. Part-time Farming
Chapter IX. Agricultural Producers and Production in the United States – A General Review
Part 10. User of Fertilizer and Lime
Part 11. Farmers' Expenditures
Part 12. Methods and Procedures

CENSUS OF AGRICULTURE: 1959
Vol. I. Counties
Vol. II. General Report – Statistics by Subjects
Vol. III. Irrigation of Agricultural Lands
Vol. IV. Drainage of Agricultural Lands
Vol. V. Special Reports
Part 1. Horticultural Specialties
Part 2. Irrigation in Humid Areas
Part 3. Ranking Agricultural Counties
Part 4. Farm Mortgage Debt and Farm Taxes
Part 5. 1960 Sample Survey of Agriculture
Part 6. A Graphic Summary of Agriculture, 1959
Part 7. Large-Scale Farming in the United States

CENSUS OF AGRICULTURE: 1964
Vol. I. Counties
Vol. II. General Report: Statistics by Subjects
Chapter 1. Farms and Land in Farms
Chapter 2. Livestock, Poultry, and Livestock and Poultry Products
Chapter 3. Size of Farm
Chapter 4. Crops, Horticultural Products, and Forest Products
Chapter 5. Characteristics of Farm Operators and Persons Living on Farms
Chapter 6. Value of Farm Products Sold and Economic Class of Farm

Chapter 7. Farm Facilities, Farm Equipment, Farm Expenditures, Farm Labor, and Cash Rent
Chapter 8. Color, Race, and Tenure of Farm Operator
Chapter 9. Irrigation, Land Improvement Practices, and Use of Agricultural Chemicals
Chapter 10. Type of Farm
Vol. III. Special Reports
Part 1. Data — Collection Forms and Procedures for Census and Selected Surveys
Part 2. Farm Labor
Part 3. Sample Survey of Agriculture
Part 4. Farm Debt
Part 5. Maps
Part 6. Procedural History
Part 7. Evaluation Surveys

CENSUS OF AGRICULTURE: 1969
Individual County Reports
Vol. I. Area Reports
Section 1. Summary Data
Section 2. County Data
Vol. II. U.S. Summary
Chapter 1. General Farm Information; Procedures of Collection, Processing, Classification
Chapter 2. Farms: Number, Use of Land, Size of Farm
Chapter 3. Farm Management, Farm Operators
Chapter 4. Equipment, Labor, Expenditures, Chemicals
Chapter 5. Livestock, Poultry, Livestock and Poultry Products
Chapter 6. Crops, Nursery and Greenhouse Products, Forest Products
Chapter 7. Value of Products, Economic Class, Contracts
Chapter 8. Type of Farm
Chapter 9. Irrigation and Drainage on Farms
Vol. III. Agricultural Services
Vol. IV. Irrigation
Vol. V. Special Reports
Part 1. Grains, Soybeans, Dry Beans, and Dry Peas
Part 2. Tobacco
Part 3. Cotton
Part 4. Sugar Crops, Potatoes, Other Specified Crops
Part 5. Vegetables, Including Tomatoes and Melons
Part 6. Fruits, Nuts, and Berries
Part 7. Poultry
Part 8. Dairy

Part 9. Cattle, Hogs, Sheep, Goats
Part 10. Horticultural Specialties
Part 11. Farm Finance
Part 12. Ranking Agricultural Counties
Part 13. Forms and Procedures
Part 14. Procedural History
Part 15. Graphic Summary
Part 16. Coverage Evaluation
Vol. VI. Drainage of Agricultural Lands

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The 1971 Canadian Census of Agriculture and Its Use in Secondary Schools

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The *1971 Canadian Census of Agriculture* is available to users in four forms: (1) the standard form, tables of data in book form; (2) tapes which can be used directly with computers; (3) microfilm; and (4) for special uses, CARTLIB. The latter is a computer base map file for census data which makes possible direct computer mapping using SYMAP or other similar computer mapping programmes. To no small degree the variety and availability of data output has been due to the influence of advisory groups from the Canadian Association of Geographers. Their work during the past seven years has made Statistics Canada far more aware of the special requirements of geographic research. For information on and ordering copies of the *Census of Canada* write Publications Distribution, Statistics Canada, Ottawa, Ontario K1A 0T6.

Before using census data it is always wise to examine the definition of various terms. This is particularly true when one considers tables which use terms such as "census farm," "improved land," and "unimproved land." Explanations are given below for selected terms.

Census Farm. Census farm is defined in the 1971 Census as a farm, ranch, or other agricultural holding of one acre or more with sales of agricultural products of $50.00 or more during the twelve-month period prior to the census. The holding may consist of a single tract of land or a number of separate tracts held under the same or different tenures and operated as a single unit. Where the census farm was made up of several parts located in different municipalities, the 1971 Census reported the complete holding as one unit in the municipality where the headquarters was located.

Improved Land. Improved land consists of four categories: cropland, improved pasture, summer fallow, and other improved land.

1. *Cropland.* Included in this term is cropland sown, or to be sown, for harvest in 1971. It includes the total area of all field crops, plus the areas of fruits, vegetables, greenhouses, mushroom houses, and nursery crops. Acreages from which sod was being sold are also included in this item rather than in other improved land as in 1966.
2. *Improved pasture.* All land which was being used for pasture or grazing and which has had some improvements made to it in recent years is included. Improvements would include cultivation, drainage, irrigation, fertilization, seeding, or spraying.
3. *Summer fallow.* The enumerator was instructed to include in this item land from which no crop was to be harvested during 1971, but which was to be cultivated or worked during the year for weed control and/or moisture conservation. Also enumerated as summer fallow were areas which were sown to a crop with the intention of ploughing the crop under as green manure.
4. *Other improved land.* This item includes the land in barnyards, home gardens, lanes, and roads on census farms. It also includes areas of cultivated land that is lying idle (neither summer-fallowed nor cropped) and newly broken land that had not been seeded to a crop.

Unimproved Land. Unimproved land has two categories: woodland and other unimproved land.

1. *Woodland.* This includes census-farm woodlots, land leased for cutting, sugar bush, and cutover land with young growth which has or will have value as timber, fuel-wood, or Christmas trees. The land on which trees have been planted for windbreaks is also included. It excludes, however, large timber tracts which are run as a separate business from the census farm.
2. *Other unimproved land.* Native pasture or hay land that has not been cultivated, brush pasture, grazing or waste land, sloughs, marshes, and rocky land are included in this item.

Economic Classification of Census Farms. The classification of all census farms into economic classes (based upon the gross income received from sales of agricultural products) presents a measure of the productive size of the holdings. With the exception of "institutional farms, etc." all census farms are classified as one of twelve economic classes based on Canadian dollars –

50-249	3,750- 4,999	15,000-24,999
250-1,999	5,000- 7,499	25,000-34,999
1,200-2,499	7,500- 9,999	35,000-49,999
2,500-3,749	10,000-14,999	50,000 and over

It has been found with students that great care must be taken to ensure that they understand fully the definitions of the various terms in their interpretation of census documents. This can best be accomplished by giving them a table to interpret, and then asking them orally just what each term means. Their curiosity is usually aroused sufficiently so that further interpretation of the data is done quite willingly.

TRENDS IN CANADIAN AGRICULTURE SHOWN BY THE 1971 CENSUS

As can be demonstrated by Table 21-1, the farm population has steadily dwindled over the past forty years and now includes

TABLE 21-1
POPULATION, NUMBER OF FARMS, AREAS, CAPITAL, VALUE OF AGRICULTURAL PRODUCTS SOLD, FOR CENSUS FARMS, 1931-1971[1]

Item	*1931*	*1951*[2]	*1971*[2]
Population			
Total population	10,376,786[2]	14,009,429	21,568,311
Farm population[3]	3,289,140	2,911,996	1,489,565
Percentage living on farms	31.7	20.8	6.9
Farms			
Number of farms	728,623	623,091	366,128
Non-resident farms	57,191	49,377	40,254
Areas (acres)			
Total land area[4]	2,180,425,600	2,271,974,400	2,278,552,320
Area in farms	163,114,034	174,046,654	169,668,614
Percentage of total land area in farms	7.5	7.7	7.4
Average area per farm	224	279	463
Use of farm land (acres)			
Improved land	85,732,172	96,852,826	108,148,877
Under crops[5]	58,732,172	62,212,148	68,765,678
Pasture	8,011,716	10,005,126	10,225,464
Capital (Canadian dollars)			
Total capital value	5,247,753,468	9,470,876,372	24,067,857,000
Average per farm	7,202	15,200	65,736
Sales (Canadian dollars)			
Total value of agricultural products sold[6]		1,742,336,904	4,147,550,680

[1] Includes selected items from Statistics Canada, *Census of Canada: Agriculture*, Table 2, 1971.
[2] Includes data for Yukon and Northwest Territories.
[3] Population living on all census-farms.
[4] Revised since the 1961 Census.
[5] Includes field, vegetable, fruit and nursery crop land.
[6] 12-month period prior to June 1, except 1971 which reports calendar year.

slightly less than 7 percent of the total population of Canada. However, agriculture is still very important to the Canadian economy. In 1971 it accounted for 20 percent of Canada's foreign exchange, and created employment for 511,000 persons. Similarly, the number of farms has declined almost 50 percent, but the size of the farms has slightly more than doubled. Despite the comments which often occur concerning the loss of farmland close to urban centres, there has actually been during the past forty years a net increase in farmland, although this masks a rather significant decrease from the peak in 1951. Of interest is the increase in improved land, including increases in both area under crops and in pasture.

It is noteworthy just how much agriculture has become "big business" when one considers the rise in capital value per farm and the increase in total value of agricultural products sold. Canadian agriculture has changed, and just as in the United States, there has been a steady increase in farm size, in capital investment required, and in the value of agricultural products sold. For students of geography a table of this type can become very relevant in setting overall patterns, and is absolutely necessary before one begins to attempt a detailed study within a regional context.

APPLICATION OF THE 1971 CANADIAN CENSUS OF AGRICULTURE TO SECONDARY SCHOOL GEOGRAPHY

The *1971 Canadian Census of Agriculture* can be examined on two levels; first, at the provincial level, and second, at the local level where the data for a given county and township can provide a base for field work. Both can provide very high returns in terms of major geographical understandings, development of statistical skills, and enthusiastic student participation.

Table 21-2 shows the total acreage of improved land for census farms in Ontario counties for 1971. The students are asked to create work teams to calculate the percentage improved land of total farm land. They then rank the data and divide it into quartiles for analysis. The percentage values are usually plotted by quartiles on an outline map of the counties of Ontario, and then the counties falling in the top quartile and the counties falling in the bottom quartile are shaded using appropriate colours or patterns (Fig. 21-1). The students then attempt to account for this distribution using population maps, physiographic maps, and climate maps. It very quickly becomes apparent that southern Ontario is the best endowed in terms of land forms and climate, and contains most of the counties in the top quartile, whereas the

TABLE 21-2
SELECTED AGRICULTURE STATISTICS FOR COUNTIES IN ONTARIO FROM 1971 CENSUS OF AGRICULTURE

Counties and Districts	*Census-Farms*[1] *Area (acres) (A)*	*Total Improved Land Area (acres) (B)*	*Percent Improved Land of Total Farm Areas (B/A X 100)*
Brant	197,794	164,413	83
Elgin	394,099	316,445	80
Essex	353,203	335,676	95
Haldimand	245,852	207,828	84
Kent	559,811	518,612	92
Lambton	574,401	467,969	83
Niagara*	252,544	210,498	83
Middlesex	662,092	538,013	81
Norfolk	329,823	251,898	76
Oxford	428,976	369,159	86
Wentworth	171,070	139,530	81
Bruce	683,736	502,085	73
Dufferin	254,832	194,887	76
Grey	760,193	491,624	65
Halton	126,912	97,539	77
Huron	742,965	611,308	82
Peel	163,588	131,524	80
Perth	500,382	443,820	86
Simcoe	588,323	418,793	71
Waterloo	249,051	210,154	84
Wellington	512,595	411,464	80
Durham	252,370	165,959	65
Haliburton	24,798	4,665	18
Hastings	436,610	192,933	44
Muskoka	43,746	13,471	31
Northumberland	318,666	190,580	60
Ontario	331,423	226,840	68
Parry Sound	162,858	44,742	[illegible]
Peterborough	259,725	129,788	[illegible]
Prince Edward	194,457	125,035	[illegible]4
Victoria	378,158	180,430	48
York	255,922	202,095	79
Carleton	390,180	262,006	67
Dundas	189,260	153,271	81
Frontenac	292,180	125,961	43
Glengarry	213,267	141,794	66
Grenville	162,157	89,191	55
Lanark	393,283	148,586	38
Leeds	326,308	149,481	46
Lennox and Addington	260,281	125,199	48
Prescott	233,051	191,231	82
Renfrew	539,711	233,080	43
Russell	122,489	104,652	85
Stormont	168,483	109,302	65
Algoma	115,747	52,990	46
Cochrane	100,456	45,470	45
Kenore	53,192	20,073	38

(Continued)

TABLE 21-2
SELECTED AGRICULTURE STATISTICS FOR COUNTIES IN ONTARIO FROM 1971 CENSUS OF AGRICULTURE

Counties and Districts	*Census-Farms*[1] *Area (acres) (A)*	*Total Improved Land Area (acres) (B)*	*Percent Improved Land of Total Farm Areas (B/A X 100)*
(Continued)			
Manitoulin	242,125	59,243	24
Nipissing	138,729	57,941	43
Rainy River	183,179	69,811	32
Sudbury	110,082	45,667	41
Thunder Bay	106,849	48,611	45
Timiskaming	211,071	121,264	57

*Regional Municipality; consists of what formerly were Lincoln and Welland counties.

[1]Census-farms are defined as agricultural holdings of one acre or more with sales of agricultural products during the twelve months prior to June 1, 1971 of $50 or more. This is the same definition that was used in the 1966 and 1961 Censuses.

Source: Statistics Canada, *Census of Canada: Agriculture, 1971.*

counties in the lowest quartile fall within or along the fringes of the Canadian Shield. They then recognize how statistical evidence can document the influence of the physical environment on agriculture. The more curious students may begin to determine farm size using this data and additional data on number of farms to see if farm size shows a similar distribution pattern.

Once facility in the analysis of statistical data is accomplished, the students are ready to assemble all the pertinent data for a given county or township and attempt to form certain conclusions. If possible, they can then be taken into the field to study sample areas in the townships to see if trends hold true based on farm interviews. This programme was carried out during the spring of 1974 with ninety senior geography students from Northern Secondary School, with rather good results.

In this field research exercise the students first used data similar to that shown in Tables 21-1 and 21-2 and then proceeded to compile other information for their particular county and township. From this preliminary activity they arrived at certain conclusions regarding type of farm, size of farm, economic class, and degree of part-time farming. They noted significant changes since 1961. Questionnaires were then designed to verify the impressions gained from the census and to attempt to explain why these changes took place. Each team of four students was given a designated area and on the day of the field exercise, the teams were taken to their areas by bus and dropped off at previously determined locations. The teams traversed their areas on foot

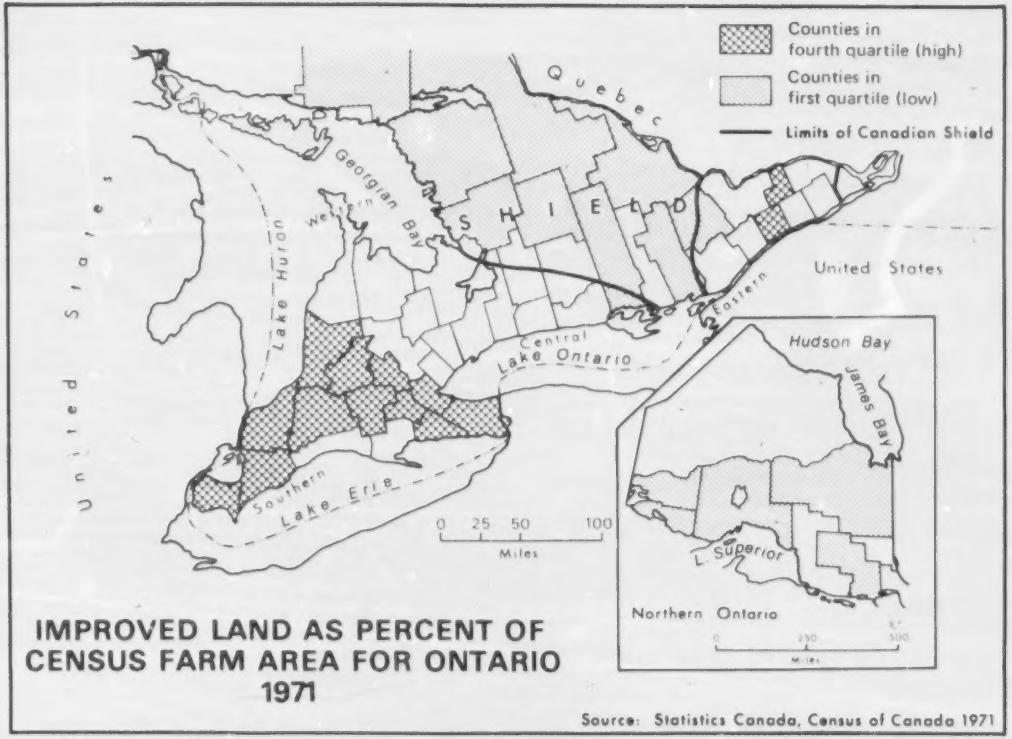
Counties in fourth quartile (high)
Counties in first quartile (low)
Limits of Canadian Shield
Quebec
United States
Georgian Bay
Western
Lake Huron
SHIELD
Eastern
Central
Lake Ontario
Southern
Lake Erie
0 25 50 100
Miles
Hudson Bay
James Bay
L. Superior
Northern Ontario
IMPROVED LAND AS PERCENT OF CENSUS FARM AREA FOR ONTARIO 1971
Source: Statistics Canada, Census of Canada 1971

Figure 21-1.

making observations and stopping at farms to seek answers for their questionnaires. At the end of three hours each team was picked up at another location. The responses to the questionnaires were tabulated and analyzed during the next few days. The experience appeared to be successful and taught the students how to cope with statistical information and how to use it in field research.

The census can be an invaluable document for use in secondary school geography classes, and if the principle of starting with the macro, and moving to the micro is utilized, the students begin to understand that a wealth of information and ability to interpret and analyze can be learned. It is hoped that this example will encourage the development by other teachers of exercises using census data.

SUGGESTED TEACHER READING

Chapman, L. J. and Putnam, D. F. *Physiography of Southern Ontario* (Toronto: University of Toronto Press, 1966).

Putnam, D. F. and Putnam, R. G. *Canada: A Regional Analysis* (Toronto: J. M. Dent and Sons, 1970). Refer especially to Chapter 6.

Putnam, R. G. and Milojevic, M. "Central Lake Ontario Plain – The Eastern Rural Urban Fringe of Metropolitan Toronto," *The Monograph*, Ontario Geography Teachers Association, No. 3, 1971-72, pp. 23-27.

Statistics Canada, *Census of Canada – 1971, Agriculture Volume IV, Part 1* (July, 1973). *Census of Canada – 1971, Agriculture, Ontario Volume IV, Part 2* (June, 1973).

Warkentin, John (Ed.), *Canada: A Geographical Interpretation* (Toronto: Methuen, 1968).

22

Historical Statistics of the United States Colonial Times to 1957

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Historical Statistics of the United States, Colonial Times to 1957 is the second of a series of basic sourcebooks which were initiated in the late 1940's by the U.S. Bureau of the Census on the recommendation of the Social Science Research Council. The first edition, *Historical Statistics of the United States, 1789-1945*, appeared in 1949 as a much briefer text than the more recent compendium. In the year following the release of the first edition, the Census Bureau approached the Economic History Association to evaluate this first effort at producing a general sourcebook of historical statistics, and a special committee was formed in the Association to consider the matter. Their report recommended that a new edition be prepared which would be not only revised, but also much broader in scope. Thus the second edition, retitled *Historical Statistics of the United States, Colonial Times to 1957*, was published in 1960 and owes its very existence to the Economic History Association, an origin which is very clearly mirrored in the selection of materials covered in its tables.[1]

The primary goal for the second edition was to aid historical economic analysis by making scattered government statistics available in a single reference work. For the most part, the data included in this volume came from a widely scattered collection of decennial censuses, a myriad of annual reports of executive agencies and special commissions, congressional records, including reports of committees, transcripts of hearings, and statistical reports of various research foundations and organizations. It was

[1] The Bureau of the Census is currently completing a new revised version of *Historical Statistics* that will include information through 1970. Another volume, *Historical Statistics of the United States; Continuation to 1962 and Revisions* (Washington, D.C.: Government Printing Office, 1965), also prepared by the Bureau of the Census, brought data forward to 1962.

the hope of the volume's editors to bring together at least the more important of these scattered statistics in a single volume and to indicate through bibliographic profiles the location of the original sources and the limitations of the data presented.

ORGANIZATION

The sourcebook is organized in twenty-four chapters which cover essentially every type of statistical data tabulated by the government, including a special "Z" chapter of pre-census colonial figures and estimates (Table 22-1). The breadth of chapter topics is impressive, with the data including every aspect of national and personal statistics that the government admits tabulating, including data on consumer prices, income, medical care, recreational facilities, money rates, copyrights, and security markets. It would appear from the table of contents, therefore, that the variety of

TABLE 22-1
PRINCIPAL CHAPTER TOPICS
HISTORICAL STATISTICS OF THE UNITED STATES, COLONIAL TIMES TO 1957

A. Population
B. Vital Statistics and Health and Medical Care
C. Migration
D. Labor
E. Prices and Price Indexes
F. National Income and Wealth
G. Consumer Income and Expenditures
H. Social Statistics
J. Land, Water, and Climate
K. Agriculture
L. Forestry and Fisheries
M. Minerals
N. Construction and Housing
P. Manufactures
Q. Transportation
R. Communications
S. Power
T. Distribution and Services
U. Foreign Trade and Other International Transactions
V. Business Enterprise
W. Productivity and Technological Development
X. Banking and Finance
Y. Government
Z. Colonial Statistics

data would be an almost limitless fountain of information for the geography teacher. Problems in its use, however, stem not from the variety of information provided, but in the value to a geographer of what was selected to be included in the book.

From a geographic perspective, the greatest shortcoming of the compendium comes from the simple fact that in the entire volume there are only about fifty tables which list data by multiple spatial units, and only about ten more which give data for individual cities and states. While superficially this may seem like a large amount of data in itself, thirty of the tables deal only with import-export trade and 30 percent of these are confined to the colonial period alone. Of the remaining spatially-oriented tables, the topics are also quite restricted in potential versatility for the classroom. Included are four tables each on politics, migration, and climate; three on communications; two each on vital statistics, fishing, and foreign in-migration; and one each on lumbering, banking, and foreign investment. The urban data are most disappointing of all, including only tables on climate, import-export trade, and price indices for selected cities.

ASSESSMENT OF THE VOLUME FOR TEACHERS

The breadth of information for the time span presented may be unparalleled in any census volume, with the possible exception of the *Statistical Abstract of the United States* (a worthy investment for any teacher). No matter how far afield student questions may be, if the government has a sustaining interest in the subject, there is a high probability that *Historical Statistics* will have at least some temporal, if not spatial, data on the topic.

The book does have some real values as a sourcebook, especially if geography is taught as an integral part of a social studies program. Consumer price indices, motor fuel usage, and foreign investments in the United States are all questions of concern to the social studies teacher today, and data for each of these subjects is available in the volume, as well as data for many other relevant topics. Furthermore, in most cases the original data sources are given with the tables, and, while most of the original sources are not available in the average school library, they often are available in city libraries if the teacher feels that a specific project at hand warrants the investment of time to search them out.

On the negative side of its use is the almost complete failure of the editors to include data on a regional, state, or city scale for spatial comparisons. The spatially arrayed data are on so many

scattered topics that making either regional or temporal comparisons of tables in discussions or activities is extremely difficult.

In perspective, the *Historical Statistics of the United States* was designed to be a standard reference work for the professional researcher, and it is remarkably successful in that aim. As a result, the compendium has somewhat limited value to the teacher except for occasional use. The volume and its revisions should not be overlooked, however, as a sourcebook of material showing historical development over a broad range of American institutions and patterns.

23

U.S. Fertility Patterns 1800-1970
A Classroom Activity

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Although it is known that the United States has finally reached a fertility level which would cause zero population growth if it were not for in-migration, most people are not aware that the present situation is just an extension of a long term process which began as early as the American Revolution. Birth rate information from the *Historical Statistics of the United States, Colonial Times to 1957* demonstrates this process to some extent in its regional context, and also gives the teacher an opportunity to discuss the whole process of birth rates and their interrelationships with the economy and general overall conditions in the country.

It is important to note that this activity is designed using white women fertility rates, the only fertility rates provided in *Historical Statistics* for the period between 1800 and 1957. Fertility rates for all women are obtainable from censuses of population, although they must be computed. Because the rates have already been developed in *Historical Statistics*, the volume is convenient for this activity. The data used here have been brought forward to 1970, from 1957, by using recent continuations to the *Historical Statistics* and the most recent population census.[1]

THE ACTIVITY

GOALS

The goals of this activity are threefold:

1. To introduce the student to the basic concepts of birth and fertility rates

[1] U.S. Bureau of the Census, *Historical Statistics of the United States; Continuation to 1962* (Washington, D.C.: Government Printing Office, 1965), pp. 4-5; and U.S. Bureau of the Census, *1970 Census of Population, Characteristics of the Population* (Washington, D.C.: Government Printing Office, 197-), pp. 496-7.

2. To help the student understand the complexity of the factors which control demographic rates in general
3. To demonstrate to the student the broad interrelationships which exist among the economy, general living conditions, and population dynamics

MATERIALS

The development of the activity requires only three basic materials:

1. Copies of the pertinent data extracted from Table 23-1
2. Sufficient copies of either graph paper or dittoed graph bases for each working group
3. Either an overhead projector slide showing the fertility rate for the United States, or possibly better, a large sheet of poster board with the curve drawn on it and sufficient space for additional curves to be added as the activity continues

DEVELOPMENT OF THE ACTIVITY

The activity is designed to operate as a threefold inquiry approach so that students may better understand the interrelationships between population dynamics of the country and the history of the nation. There are three basic phases of the activity.

Phase One. Introduce Figure 23-1 to the class and generate discussion about the curve and provide explanation of its nature. Start initially with the jogs and breaks in the basic curve and let the class explore the possible factors which might underlie these changes in fertility rates when they occur. Once they have gotten the grasp of the nature of controls on fertility rates, allow the students to start examining the overall trend of the curve. If local resources and the discussion warrant, let several students check the birth or fertility rates of other countries during the same overall period to see if similar long-term decline occurred elsewhere in the world. Before leaving the discussion it might be fruitful for the teacher to introduce the concept of demographic transition and have the students apply it to the present case. (See Notes to the Teacher for discussion of demographic transition.)

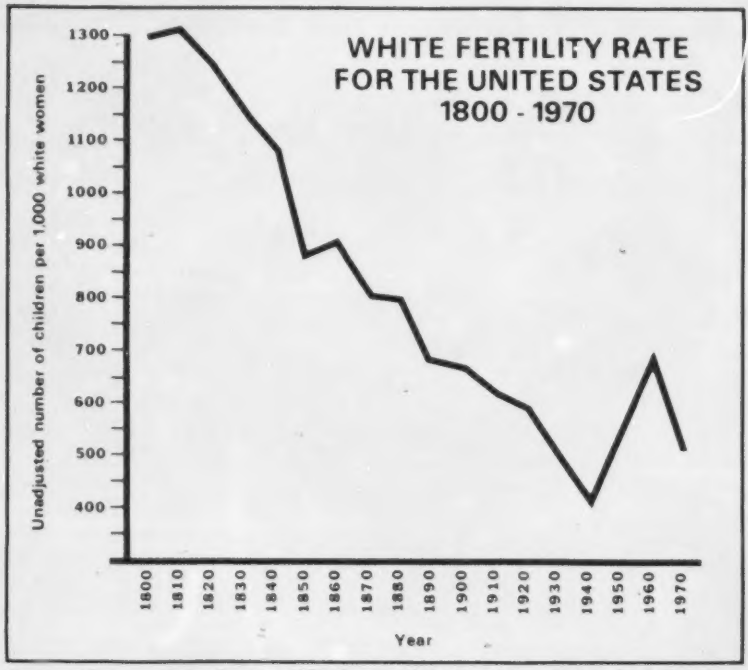
Phase Two. Divide the class into nine groups and assign each one a region of the United States. Have each group graph the fertility curve for that region and then explain the curve for that specific region during the period graphed. Because the group may become bogged down during the discussion, suggest that each compare its regional curve to that of the nation as a whole. This will help the groups understand their own patterns and add mean-

TABLE 23-1
FERTILITY RATES OF WHITE WOMEN 1800-1970

	1800	*1810*	*1820*	*1830*	*1840*	*1850*	*1860*	*1870*	*1880*	*1890*	*1900*	*1910*	*1920*	*1930*	*1940*	*1950*	*1960**	*1970**
U.S.	1281	1290	1236	1134	1070	877	886	796	754	667	644	609	581	485	400	551	667	369
N. Eng.	1098	1052	930	812	752	621	622	544	498	440	478	482	518	441	347	516	664	385
Mid. Atl.	1279	1289	1183	1036	940	763	767	679	624	547	549	533	539	424	320	471	602	386
E. N. Cen.	1840	1702	1608	1467	1270	1022	999	869	757	653	599	555	548	458	388	552	704	386
W. N. Cen.		1810	1685	1678	1445	1114	1105	990	905	781	710	630	584	495	431	600	743	384
S. Atl.	1345	1325	1280	1174	1140	937	918	811	851	777	779	760	694	593	464	572	588	351
E. S. Cen.	1799	1700	1631	1519	1408	1099	1039	903	926	850	834	817	734	655	539	631	656	418
W. S. Cen.		1383	1418	1359	1297	1046	1084	935	1043	968	925	845	686	584	474	607	695	376
Mtn.						886	1051	967	872	757	720	661	664	582	526	663	775	392
Pac.						901	1026	888	775	587	512	460	425	360	339	539	653	356

*Data for total population

Sources: U.S. Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1957*, p. 24; U.S. Bureau of the Census, *Historical Statistics of the United States; Continuation to 1962*, pp. 4-5; U.S. Bureau of the Census, *Census of Population, 1970*, Vol. I, *Characteristics of the Population*, Part 1, United States Summary, Sec. 1, pp. 496-7.



Sources: Bureau of the Census, *1970 Census of the Population*, Vol. 1, Pt. 1, Sec. 1, p. 496-7; *Historical Statistics of the United States, Colonial Times to 1957*, p. 24; *Historical Statistics of the United States, Continuation to 1962*, pp. 4-5.

Figure 23-1.

ing to their explanations. Each group should present its findings to the entire class.

Phase Three. After all the groups have discussed their regional patterns, have them place their curves on the master sheet containing the curve for the United States. If possible, use different colors for each curve so that it will be possible to follow the progress of each region easily through time. It should become readily apparent that there are great differences among the curves of the various regions. Begin a discussion on how and why reactions differ among regions through time to the same stimuli. Follow individual lines through the maze of curves to determine what kinds of variations occur when the whole pattern is examined. Some specific questions which might be raised during the discussion include:

1. Why do some regions change relative position within the graph through time?
2. In the case of the Pacific and Mountain divisions note that in both cases the curves make a radical jump upwards in the first decade and then start a normal descent. Why do you think this happened?
3. The Pacific region starts as one of the highest divisions, but quickly drops to one of the lowest. What do you think might cause this?
4. Why is there such a significant drop of fertility in 1940?
5. Why is there a plateau of declining births between 1850 and 1860?
6. In New England there is a slight increase in fertility rates between 1890 and 1920 while other regions continue their normal decline. Why?
7. The East South Central district begins as one of the highest fertility areas and keeps that status through much of its history. Why?
8. Make a series of maps of the United States, one for each decade, showing the distribution of high and low fertility in the country by region. Does this help explain any of the patterns questioned above?

Quite apparent is the clear differentiation of fertility rates between frontier and settled areas. Whether American fertility rates are mapped on a regional base, or on a state base, or even on a microbase, there seems to be a pattern of frontier areas possessing higher fertility rates than non-frontier areas, even though the relative size of the rural population may be identical for both. The reason for this is not clear, although a possible factor may well stem from an attitude prevalent on the frontier that there was a need to help populate the area to make it settled as soon as possible.

NOTES TO THE TEACHER

The teacher should read the following materials prior to developing the activity in the classroom. Many of these materials are relevant to Phase One of the activity, and considerable discussion should evolve concerning these basic ideas.

MEASURING FERTILITY

There are three principal ways fertility is generally measured: (1) crude birth rate (CBR), (2) (general) fertility ratio, and (3) total fertility rate. *Crude birth rate* is the most commonly used of

these, principally because it is the simplest to compute and has the least data requirements. This rate is computed by dividing the number of live births in a given year by the total population, and then usually multiplying this ratio by 1,000. The resulting figure is essentially the number of live births per one thousand population. While this index is simple to compute and easy to understand, it does have a number of inherent pitfalls as an indicator of fertility, including:

1. The number of babies born with a given group often varies significantly from year to year, especially among relatively small groups.
2. Crude birth rate presumes that the age structure of the population is uniform. If the population is either older or younger than average, however, there will be gross misrepresentations of the actual rate of births among fertile women for that population. For example, in a population which is older than average there may be a very high rate of births among those women who are physically capable of having children, while the CBR computations would indicate that there is a low overall fertility in that group.
3. Crude birth rate presumes that the sex structure is in balance, or at least is similar among the populations under consideration. Again, if maladjustments in the relative number of women are present within a given group incorrect assumptions about relative fertility within that group may result.

Fertility ratios were developed in an attempt to circumvent these problems. The data used in fertility ratio computation considers both a broad temporal base (five years) and only fertile women (15-44 years of age). The computation of fertility ratio is generally as follows:

$$\text{Fertility ratio} = \frac{\text{children under 5}}{\text{women 15-44}} \times 100$$

The data given in Table B 37-68 of the *Historical Statistics of the United States* varies somewhat from this basic formula in that women aged 20 to 44 are considered (this should have little effect on the internal comparison of figures in the activity). The U.S. Census Bureau's most recent figures for fertility ratio in the United States were 69.3 for 1973, compared with 87.9 for 1970, and 122.9 for 1957.

The *total fertility rate* is the best fertility measure and is based on the number of children per 1,000 women: not on children already born, but on the total number of children projected for each completed family. The computation of this figure is complex,

and because it is based on projections of completed family size, there are some built-in hazards in its use. For a basis of comparison the total fertility rate for the United States in 1973 was 1902, or somewhat less than two children per woman in a completed family, as compared with 2480 for 1970, and 3767 for 1957.

DEMOGRAPHIC TRANSITION

A major concept which needs introduction is that of *demographic transition.* This concept runs as an implicit theme throughout the entire activity and should be well-understood by the teacher before embarking on the project. The basic theory of demographic transition asserts that upon reaching a certain level of economic achievement the population of a given society will undergo a radical shift in both birth and death rates from relatively high to relatively low levels. Initially only the death rate will fall and there will occur automatically an upward thrust in the overall population levels of the society. As the intensity of economic development continues, the birth rate also will undergo a radical drop (according to the theory) and both rates will reach a new level of near equilibrium at much lower levels.

The factors which bring about this traumatic shift in birth and death rates are not clearly understood, but seem to be associated with the processes of increasing urbanization, accompanied by a greater desire among urban families to limit family size. It has been inherent in most geographical regions that during the industrialization process there is (or has been) significant urban growth; and traditionally with urban in-migration comes a drop in overall birth rates. Accompanying this pattern seems to be a desire among many parents to limit family size because of increasing concern for the future of each individual child. These parents see a world of growing complexity which requires more educational and financial resources for each person. It should be recognized, however, that these needs are not evenly felt throughout all rural and urban populations. Nevertheless, those potential parents who have benefitted most by the region's overall development process are more likely to perceive the greater resource needs of future children. These parents are more likely to limit family size than those who have not benefitted by the economic growth of a society. The latter see little need to prepare individual children for higher levels of economic achievement than they themselves were able to obtain. As the impact of overall development continues to spread throughout the society, there is a concomitant decline in these variations in perception; thus regional variations in fertility rates begin to disappear. This process is one of the most important

trends which should be noted from the United States regional fertility patterns: an overall decline in regional variations, regardless of the levels of urban population or economic opportunity.

DETERMINANTS OF FERTILITY

When discussing the factors underlying general fertility rates, a clear distinction should be made between the determinants underlying group and individual levels. Group dynamics are relatively easy to understand, among the best known being war, impending war, depression, inflation, poor crops, controlled economic growth, and changing attitudes about the role of the family. Variations in the fertility ratio for the United States (Fig. 23-1) may easily be related to all these factors. They will also be visible in the regional graphs developed by the class groups.

The determinants of fertility among individuals are more difficult to understand and discuss, especially in a classroom situation. It must be clearly brought out at the very beginning that while a certain percentage of children are not planned, most children are brought into this world either because the parents want them, or are not concerned if they have additional children. Even the most uneducated of families can develop at least a certain level of fertility control through abstinence and other methods if their desires are high enough. The second point which must be made is that one must distinguish between associative and causative conditions of high and low fertility. Poverty, for example, is clearly associated with high fertility, but poverty *per se* does not *cause* high fertility. Lack of money relative to the society as a whole is only nominally related to the presence of large families, but the association between the two phenomena is real. All things being equal, poor people have more children than affluent people. It is not the poverty which causes larger families, but rather it is the common characteristics and attitudes frequently held by poverty families (frequently referred to as the "culture of poverty") which are conducive to high fertility.

Causal factors of high fertility. Behavioral studies of why some families have high and others low fertility profiles are still in their infancy, but there is an ever-growing amount of evidence that illustrates certain basic points. One study of new mothers in Lexington, Kentucky, attempted to face this problem and came to a number of tentative conclusions which seem to hold validity, although statistically they were considered to be inconclusive.[2]

[2] William B. Clifford, II, "Modern and Traditional Value Orientations and Fertility Behavior: A Social Demographic Study," *Demography*, Vol. 8, No. 1 (1971), pp. 37-48.

The high fertility mothers held a number of views and attitudes in common, including:

1. A general feeling of fatalism in that people are unable to control either their future or fate
2. That sexual activity is primarily a duty for procreation
3. That their social lives were highly oriented toward family and kinship relationship
4. That they perceived their lives in general as being existence- or being-oriented
5. That time was uncontrollable and, therefore, they had become almost totally present-oriented

Although this study does not tell the entire story by any means, it does begin to indicate the extent of causally-determined factors.

A study of Appalachian families suggested that not infrequently the wife's role in the family was principally that of mother, and when the children were grown, she often felt left out of the day-to-day life of the family unit. Her husband tended to be oriented toward male peer groups and the grown children toward their own peer groups. The result was a tendency for the wife to have more offspring to fulfill her needs within the family unit.[3]

A third area in which attitude plays an important role in determining the number of children in a completed family is the general attitude toward children in the unit. While almost all people would claim to like children, small children do play different roles in family units among various cultural subgroups in this country. Small children and their associated play and noise are quite important among some sub-cultures. As a result these groups tend to produce a larger number of children, not because they cannot control their fertility, but rather because they just like to have large numbers of children around the house. While this attitude is generally not phrased in quite this manner, one often hears it said among these people that a "house is not a home without the sounds of children running and playing."

Finally, before leaving the discussion of behavioral factors influencing high fertility rates, there is the phenomenon known as *machismo*. Machismo is the attitude among many Latin groups that the only true sign of manliness and virility is the number of children that a man can produce. A man who has a strong feeling of machismo must, therefore, produce a significant number of children to prove his virility to himself and his friends.

Associative factors of high fertility. Associative factors are those which are often linked to high fertility, but are not the

[3] Jack E. Weller, *Yesterday's People: Life in Contemporary Appalachia* (Lexington: University of Kentucky Press, 1966), pp. 61-63.

direct causes. Poverty was discussed above in this regard in that it does not cause large families, but rather those families which are less affluent seem more likely to have various attitudes associated with high fertility profiles and thus tend to have more children than families in the society as a whole. Some of the most common socio-economic conditions associated with high fertility include (1) poor education, (2) membership in a minority group, (3) type of employment, (4) poverty, (5) religion. With the possible exception of religion, none of these socio-economic characteristics are direct causes of high fertility patterns, but rather, the people who are in these categories are more likely to display any or all of these factors which are often associated with a high fertility profile.

Other contributing factors. There are other contributing factors which do not fall clearly into either the associative or causative ranks, but which seem to be important in the overall group dynamics of fertility. In the United States, ever since there have been cities, there has been a differentiation of fertility rates between urban and rural areas. The principal contributing causes for the higher rural rates have been ascribed to the availability of additional space on the farm at no cost, the lack of additional cost for food, and finally, that children are assets in getting farm work completed. While it cannot be questioned that most farms have adequate external space for additional children, the inside of farmhouses is as finite as the inside of a house in the city. Are farmhouses larger because farm families are larger, or are they larger because there is no need for them to be small? This must remain an unanswered question, but it should be kept in mind that (with the exception of the early log and sod houses) farm housing is built by contractors just as is urban housing. In reference to food production there is no question that in the early days of subsistence farming most foods were produced on the farm, but what of today's commercial agriculture?

Finally, there is the issue of helping out on the farm. How many years is a child an effective helper around the farm, and how many years is he too young to be of significant assistance? A dramatic differential between rural and urban family size existed in New England during the early nineteenth century at a time when children were a working asset in the city as well. Textile mills preferred to hire children, and indeed the urban child could earn his full keep sooner in the textile mills than on the farm, yet the rural/urban fertility differentiation persisted. Perhaps in the final analysis, Calhoun's studies of rat behavior which indicated

that as crowding increased the fertility rate decreased, as a function of crowding, may well be the most important underlying theme in this differentiation.[4]

[4] Calhoun's work is discussed in general in its relationships to man's space perceptions in Edward T. Hall, *The Hidden Dimension* (Garden City, N.Y.: Anchor Books, 1966), pp. 23-32.

24

Recent Federal Mapping of Interest to Geography Teachers

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Geography teachers are fortunate in having two remarkably good map sources at their disposal for the preparation of geographical lessons and activities. The *GE-50 Series* of United States maps can be purchased and used in the classroom; several maps can be used by student groups to learn about regional variations in the United States. The *National Atlas of the United States of America*, although an expensive volume probably precluding individual classroom use, can be provided by school libraries. It is a compendium of many maps, and can provide the teacher with numerous and interesting geographical topics for student probing and discussion. This essay points out various aspects of both map sources to acquaint the teacher with their potentialities for use in teaching.

THE GE-50 SERIES MAPS

The U.S. Census Bureau has produced a selection of excellent maps of the United States in the *GE-50 Series*. As of September, 1974, a total of fifty-seven of these maps had been published. Unfortunately, a number of the earlier maps are now out of print, although some have been reissued. The *GE-50 Series* maps are published at a scale of 1:5,000 000 and can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

One of the major values of this map series is that the data base is the county unit. Additionally, the Census Bureau has converted an enormous amount of cumbersome numerical data, extracted from various sources, into attractive and informative maps. The series covers a variety of subjects that may be subdivided into

seven general categories: agriculture, demography, economic, education, ethnic, political-administrative, and socio-economic. These seven subdivisions are provided only as a format for further discussion of the map series.

AGRICULTURE

Two of the maps in this group deal with farm size in 1964 and percent change in farm size in the United States between 1940 and 1964. The location of the remaining areas of small farms, and the general trend of increasing farm size are clearly shown. The value of farm products sold in 1964, and the percent change in the value of farm products sold between 1939 and 1964 are the subjects of two other maps. Map number 34, which shows percent change rather than total corn yield, highlights the increases in corn production in the Southeastern United States.

Summary of Maps in This Group

GE-50. No. 29. Size of Farms, by Counties of U.S.: 1964
GE-50. No. 30. Percent Change in Size of Farms by Counties of U.S.: 1940-1964
GE-50. No. 31. Value of Farm Products Sold per Acre of Land in Farms, by Counties of the U.S.: 1964
GE-50. No. 32. Percent Change in the Value of Farm Products Sold per Acre of Land in Farms, by Counties of the U.S.: 1939-1964
GE-50. No. 33. Corn Yield per Acre by Counties of the U.S.: 1964
GE-50. No. 34. Percent Change in Corn Yield per Acre, by Counties of the U.S.: 1939-1964

DEMOGRAPHY

This represents the largest single category in the GE-50 Series and is composed of fourteen maps. The individual map topics range from population distribution, urban and rural, for 1960 and 1970, to older Americans by counties in 1960 and 1970. Maps of population density by counties of the United States for 1970 and the percent change in these populations between 1960 and 1970 are most informative. Net migrations of population by counties, 1960-1970, provides additional demographic data. There is a series of three maps showing the standard metropolitan statistical areas for the nation in 1963, 1967, and 1970. Another valuable map in this group is one which presents the percent of county populations urban in 1970.

Summary of Maps in This Group

GE-50. No. 1. Population Distribution, Urban, Rural in the U.S.: 1960
GE-50. No. 2. Standard Metropolitan Statistical Areas in the U.S. and Puerto Rico: 1963
GE-50. No. 7. Older Americans in U.S. By Counties: 1960
GE-50. No. 17. Standard Metropolitan Statistical Areas: 1967
GE-50. No. 36. Older Americans by Counties of the U.S.: 1970
GE-50. No. 37. Year of Maximum Population by Counties of the U.S.
GE-50. No. 38. Population Density by Counties of the U.S.: 1970
GE-50. No. 39. Percent of Population Urban by Counties of the U.S.: 1970
GE-50. No. 40. SMSAs of the U.S. and Puerto Rico: 1970
GE-50. No. 41. Percent Change in Population by Counties of the U.S.: 1960-1970
GE-50. No. 42. Population Trends by Counties of the U.S.
GE-50. No. 43. 1970 Population as a Percent of Maximum Population by Counties of the U.S.
GE-50. No. 44. Net Migration by Counties of the U.S.: 1960-1970
GE-50. No. 45. Population Distribution, Urban and Rural, in the U.S.: 1970
GE-50. No. 55. Standard Metropolitan Statistical Areas; Area Defined by Office of Management and Budget: January 1, 1974

ECONOMIC

This broad category may be further divided into a number of sub-topics. Three maps deal with the spatial characteristics of housing, ranging from housing built before 1950 to housing owned and rented in 1960. The third map shows housing construction authorized between 1964 and 1967. Retail and wholesale trade characteristics for 1963 are presented in a series of three maps. In addition, two maps provide inflow and outflow of commodities shipped by manufacturers to census geographic divisions for 1963. Maps number 12 and 13 are devoted to employment in manufacturing and employment in professional and technical occupations for 1960. Finally, two maps based on 1963 data show the spatial characteristics of manufacturing and mineral industries in the United States.

Summary of Maps in This Group

GE-50. No. 4. Housing Built Before and After 1950 in SMSA of U.S.: 1960
GE-50. No. 5. Housing Owned and Rented in SMSA of U.S.: 1960
GE-50. No. 12. Employment in Manufacturing, by Counties of the U.S.: 1960
GE-50. No. 13. Employment in Professional, Technical and Kindred Occupations by Counties of the U.S.: 1960
GE-50. No. 18. Related Trade in the U.S.: 1963
GE-50. No. 19. Sales of Retail Shopping Goods Stores for Selected SMSAs in the U.S.: 1963
GE-50. No. 20. Wholesale Trade in the U.S.: 1963
GE-50. No. 21. Hotel, Motel Receipts in U.S.: 1963
GE-50. No. 22. Manufacturing in the U.S.: 1963
GE-50. No. 23. Mineral Industries in the U.S.: 1963
GE-50. No. 26. Shipments of Commodities by Manufacturers in the Conterminous U.S. Outflow to Census Geographic Divisions: 1963
GE-50. No. 27. Shipment of Commodities by Manufacturers in the Conterminous U.S. Inflow to Census Geographic Divisions: 1963
GE-50. No. 28. Housing Construction Authorized in Permit Issuing Places by Selected SMSAs of the U.S.: 1964-1967

EDUCATION

The two maps in this group are devoted to the population with a high school education, and youths sixteen and seventeen years of age in school in 1960.

Summary of Maps in This Group

GE-50. No. 9. Population with High School Education or More, by Counties of U.S.: 1960
GE-50. No. 10. Youths of 16 and 17 years of Age in School by Counties in the U.S.: 1960

ETHNIC

There are a total of eleven maps in the ethnic category. Four deal with various aspects of Negro population. A most interesting comparison that can be made is the percent of the total population Negro for the census years 1960 and 1970. Another map shows the number of Negro persons by county in the United States in 1970. A most valuable map in this category provides the

percent change in Negro population by county between 1960 and 1970. Two additional maps show the distribution and areas of concentration of American Indians in 1960 and 1970. The distribution and density of Chinese and Japanese in 1960 is presented on a single map, but separate maps showing the location and density of Chinese and of Japanese persons were issued in 1970. The two remaining maps in this category are devoted to the number of Filipinos by county in 1970 and the number of persons of Spanish origin in the United States for the same year.

Summary of Maps in This Group

GE-50. No. 14. American Indians in the U.S.: 1960
GE-50. No. 15. Japanese and Chinese in the U.S.: 1960
GE-50. No. 16. Negro Population as a Percent of the Total Population, by Counties of the U.S.: 1960
GE-50. No. 47. Number of Negro Persons, by Counties of the U.S.: 1970
GE-50. No. 48. Negro Population as a Percent of Total Population by Counties of the U.S.: 1970
GE-50. No. 49. Number of American Indians, by Counties of the U.S.: 1970
GE-50. No. 50. Number of Chinese, by Counties of the U.S.: 1970
GE-50. No. 51. Number of Japanese, by Counties of the U.S.: 1970
GE-50. No. 52. Number of Persons of Spanish Origin, by Counties of the U.S.: 1970
GE-50. No. 53. Number of Filipinos by Counties of the U.S.: 1970
GE-50. No. 54. Percent Change in Negro Population, by Counties of the U.S.: 1960-1970

POLITICAL-ADMINISTRATIVE

Congressional Districts of the United States for the 89th to 93rd Congresses are the topics of these five maps. Of particular interest are the changes shown in the boundaries of the Congressional Districts for the period. Redistricting actions for 1964, 1968, and 1970 are included in this group of maps. Persons interested in the spatial ramifications of these political changes will find these maps most revealing and valuable.

Summary of Maps in This Group

GE-50. No. 3. Congressional Districts for the 89th Congress (includes redistricting actions to Sept. 1964)

GE-50. No. 11. Congressional Districts for the 90th Congress (1967-1968)
GE-50. No. 25. Congressional Districts for the 91st Congress (includes redistricting actions to Aug. 1, 1968)
GE-50. No. 35. Congressional Districts for the 92nd Congress (includes redistricting actions to Aug. 1, 1970)
GE-50. No. 46. Congressional Districts for the 93rd Congress.

SOCIO-ECONOMIC

Poverty areas of the nation in 1960 are graphically displayed in this group of maps. The five maps include families in poverty areas in 1960, families with incomes below $3,000 in 1959, per capita income for 1959 and for 1969, and median family income for 1969. While poverty areas are highlighted in two of the maps, the per capita income maps provide some indication of the more affluent areas of the nation.

Summary of Maps in This Group

GE-50. No. 6. Families with Incomes Under $3,000 in 1959 by Counties of the U.S.: 1960
GE-50. No. 8. Per Capita Money Income for 1959 by Counties of the U.S.
GE-50. No. 57. Per Capita Money Income for 1969, by Counties of the U.S.
GE-50. No. 24. Families in Poverty Areas of the U.S.: 1960
GE-50. No. 56. Median Family Income for 1969, by Counties of the U.S.

THE NATIONAL ATLAS OF THE UNITED STATES OF AMERICA

The *National Atlas of the United States of America*, a massive volume, contains a variety of very useful and informative maps for the teacher and students. The atlas is published by the U.S. Department of the Interior, Geological Survey, and can be obtained from the Government Printing Office. The first portion of the atlas is devoted to a series of general reference maps which contain some 41,000 place names. These include maps of the fifty states at a scale of 1:2,000,000 and twenty-seven city maps at a scale of 1:500,000.

Special subject maps which show various distributional patterns on a national basis make up a 281-page section of the atlas. These special subject maps are limited to three scales:

1:7,500,000, 1:17,000,000, and 1:34,000,000. There are six plastic overlays that fit over the thematic maps providing both greater detail and political boundaries. The thematic maps convey many aspects of the economic development of the nation as well as man/environment relationships. The major topics under the special subject maps include: physical, history, economic, socio-cultural, administrative, mapping and charting, and the world.

CONCLUSION

Various classroom activities utilizing census sources have been presented in this *NCGE Pacesetter* volume. The authors have pointed out in many instances that students should be encouraged to find other sources to explain geographical variation in the United States. Both the *GE-50 Series* maps and the *National Atlas* should be very helpful in this regard. Teachers can easily display individual *GE-50 Series* maps around the classroom at the start of, and during, a unit or lesson. They will not only encourage further inquiry, but will frequently serve to supply data in themselves. Regional contrasts and spatial correlations will emerge. For more extensive data gathering exercises, students should be assigned to the *National Atlas*; it contains a wealth of geographical information from which students can verify their work, or develop hypotheses around which further classroom involvement can be generated.

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